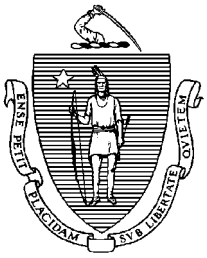
Environmental Performance Partnership Agreement: 2002-2003

May 2002

Massachusetts Department of Environmental Protection

U.S. Environmental Protection Agency
New England



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XIII. Prevent and Manage Waste

Prevent and Manage Waste Goal #1: National Air Strategy (Ensure that Massachusetts citizens have clean air to breathe)

Prevent and Manage Waste

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A. Self Assessment

1. Introduction

How does DEP work to provide clean air?

DEP's goal is to provide clean air, which meets all health-based air standards established by the EPA, to all cities and towns in Massachusetts. DEP uses a variety of regulatory, permitting, compliance assistance, and enforcement approaches to do the following while accommodating population and economic growth:

- reduce the emissions of ozone precursors in Massachusetts
- reduce the transport of ozone and ozone precursors into Massachusetts from out-of-state sources
- manage emissions of criteria pollutants other than ozone, and
- decrease the emissions of toxic air pollutants.

What are the standards DEP uses to provide clean air?

The Clean Air Act of 1970 authorized the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for air pollutants which threaten human health and public welfare when found in high enough concentrations over certain periods of time. These "criteria pollutants" are sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), particulate matter less than 10 microns (PM-10), particulate matter less than 2.5 microns (PM-2.5), and lead (Pb).

Table 9 lists the NAAQS. The primary standards are designed to protect public health, particularly the health of the most sensitive populations like the young, the elderly, pregnant women, and individuals with pre-existing lung and cardiovascular diseases. More than 750,000 people in Massachusetts have pre-existing lung disease. The secondary standards protect ecosystems, including plants, water, fish and wildlife, and man-made materials, such as rubber and paints, from the harmful effects of air pollution.

See Table 10 for information on the sources and effects of criteria pollutants. EPA assesses the adequacy of these standards regularly, in light of new health and scientific data, and revises them accordingly.

What is the status of the new ozone standards EPA adopted?

In July 1997, EPA revised the ozone standard from a 1-hour standard of 0.12 ppm to an 8-hour standard of 0.08 ppm. The 8-hour standard is calculated as the 3-year average of the annual fourth-highest daily maximum 8-hour concentration. In August, 2000 Massachusetts' Governor Cellucci recommended to EPA that it designate Massachusetts as non-attainment under the 8-hour standard. The Governor further recommended that the state have two non-attainment areas in eastern and western Massachusetts, with boundaries the same as under the 1-hour standard.

In 1997, EPA added a new fine particulate standard: particulate matter less than 2.5 microns (PM-2.5). These smaller (or fine) particulates are largely responsible for the health effects of greatest concern, and for visibility impairment (such as atmospheric haze which obscures scenic views). Massachusetts currently has a statewide PM-2.5 network of 22 sites in 17 cities which began operating in 1998, and will add additional sites in 1999.

The new air quality standards have been the subject of litigation, which has delayed their implementation. In February, 2001 the U.S. Supreme Court upheld the new standards but remanded them back to the D.C. Circuit Court for reconsideration of a number of legal issues. There is still no timetable for implementation of the new standards in light of the ongoing legal action.

How does DEP determine if the standards are being met?

To determine if Massachusetts meets the NAAQS, DEP's ambient air monitoring network operates with 41 sites throughout the state. DEP also has a Photochemical Assessment Monitoring System (PAMS) network with seven sites. The PAMS sites measure individual organic compounds or classes of organic compounds, some of which are toxic. DEP is facing major challenges in continuing to operate these networks while maintaining an extensive PM-2.5 network. DEP expects to work with EPA on areas where efforts can be adjusted and will be forwarding those requests to EPA New England. However, community groups have indicated in recent discussions an interest in DEP expanding its air monitoring network, due to their interest in cumulative impacts and emissions from existing and proposed power plants, even when evidence points to continued progress in reducing air pollutants covered by the NAAQS. The challenge is to balance these concerns with the need to perform assessments of statewide air quality, given technical, scientific and fiscal constraints.

Table 7: National Ambient Air Quality Standards

- **Primary Standards –** designed to protect public health against adverse health effects with a margin of safety.
- **Secondary Standards** - designed to protect against effects such as damage to vegetation and buildings.

Pollutant	Averaging Time*	Primary	Secondary
SO_2	Annual Arithmetic Mean	0.03 ppm (80 μg/m³)	None
	24-Hour	0.14 ppm (365 μg/m³)	None
	3-Hour	None	0.50 ppm (1,300 μg/m³)
CO	8-Hour	9 ppm (10 mg/m³)	Same as Primary Standard
	1-Hour	35 ppm (40 mg/m³)	Same as Primary Standard
O_3	1-Hour	0.12 ppm (235 μg/m³)	Same as Primary Standard
	8-Hour	0.08 ppm (157 μg/m³)	Same as Primary Standard
The 1-hour standard continues to apply to the entire state. To meet the 1-hour standard, no more than 3 exceedances may be recorded at any monitor during a 3-year period. An exceedance is a 1-hour concentration of .125 ppm or above. The 1-hour standard is met when the exceedance days (the daily maximum 1-hour concentration exceeds 0.12 ppm) do not exceed one per year (3-year average). The 8-hour standard is met when the 3-year average of the 4th-highest daily maximum 8-hour average does not exceed 0.08 ppm.			
Pb	Calendar Quarter Arithmetic Mean	1.5 μg/m³	Same as Primary Standard
NO_2	Annual Arithmetic Mean	0.053 ppm (100 μg/m³)	Same as Primary Standard
PM-2.5 Particulates up to 2.5 microns in size	Annual Arithmetic Mean	15 μg/m³	Same as Primary Standard
	24-Hour	65 μg/m³	Same as Primary Standard
• The annual standard is met when the annual average of the quarterly mean PM-2.5 concentrations is less than or equal to 15 μg/m³ (3-year average). If spatial averaging is used, the annual average from all monitors within the area may be averaged in the calculation of the 3-year mean. • The 24-hour standard is met when 98th percentile value is less than or equal to 65 μg/m³ (3-year average).			
PM-10 Particulates up to 10 microns in size	Annual Arithmetic Mean	50 μg/m³	Same as Primary Standard
	24-Hour	150 μg/m³	Same as Primary Standard
• The PM-10 standard is based upon estimated exceedance calculations described in 40 CFR Part 50, Appendix K. • The annual standard is met if the estimated annual arithmetic mean does not exceed 50 μg/m³. • The 24-hour standard is attained if the estimated number of days per calendar year above 150 μg/m³ does not exceed one per year.			

μg/m³ = micrograms per cubic meter **ppm =** parts per million **mg/m³ =** milligrams per cubic meter

- Standards based upon averaging times other than the annual arithmetic mean must not be exceeded more than once a year.

Table 8: Criteria Pollutants - Their Sources and Effects

Pollutants and Their Sources	Health and Welfare Effects
***Ozone (O_3)** Ground level O_3 is not emitted directly. It is a product of photochemical reactions involving nitrogen oxides and volatile organic compounds (VOC) - which are typically emitted in motor vehicle exhaust and industrial processes using solvents. O_3 is formed downwind of these sources. Warm temperatures and sunlight stimulate O_3 formation.	**Health:** O_3 is a highly reactive gas which irritates the mucous membranes and other lung tissues causing respiratory impairment. O_3 has been found to affect not only those with respiratory problems, such as asthma, but also healthy adults and children. Effects include breathing difficulty when exercising and reduced resistance to respiratory infections. Acute exposures cause bronchial constriction, lung edema, and abnormal lung development. **Welfare:** Toxic to plants causing leaf damage and decrease in growth. Weakens materials such as rubber and fabrics.
Carbon Monoxide (CO) The largest source of CO emissions are from motor vehicles resulting from the incomplete combustion of carbon in fuels. High levels of CO are possible near large parking lots and city streets with large numbers of slow-moving cars.	**Health:** CO enters the bloodstream by combining with hemoglobin which reduces the amount of oxygen carried to organs and tissue. The health threat is most severe for those with cardiovascular disease. Healthy individuals are affected at higher concentrations (> 30 ppm). Symptoms include shortness of breath, chest pain, headaches, confusion, and loss of coordination. **Welfare:** No known effect on materials or vegetation.
Sulfur Dioxide (SO_2) SO_2 results largely from coal and oil combustion in heat and power generation facilities. Other sources include pulp and paper mills, refineries, and non-ferrous smelters.	**Health:** SO_2 combines with water vapor to form acidic aerosols which irritate the respiratory tract. It aggravates symptoms associated with chronic lung diseases such as asthma and bronchitis. **Welfare:** SO_2 is a primary contributor to acid deposition which causes acidification of lakes and streams. Acid deposition also damages materials (corrodes metals, degrades rubber and fabrics), injures vegetation, and causes visibility degradation.
Nitrogen Dioxide (NO_2) NO_2 is formed from the oxidation of nitric oxide (NO). NO is generated when combustion temperatures are high. Major sources of NO are power plants and automobile engines. NO and NO_2 are O_3 precursors.	**Health:** NO_2 can lower resistance to respiratory infections and aggravates symptoms associated with asthma and bronchitis. **Welfare:** NO_2 decreases visibility by causing a reddish-brown haze. It is a contributor to acid deposition which causes acidification of lakes and streams, as well as plant injury and damage to materials (metals, rubber, fabrics).
Particulates (PM-10 and PM-2.5) Particulate matter are tiny airborne particles or aerosols which include dust, dirt, smoke, and liquid droplets. PM-10 encompasses particulate matter with an aerodynamic diameter of 10 microns or less; PM-2.5, of 2.5 microns or less. Sources include fossil fuel combustion emissions, industrial process emissions, and motor vehicles.	**Health:** PM-10 particles, because of their small size, are able to be inhaled and reach the thoracic region of the respiratory system. The health effects are often not immediately noticed. The particulates can accumulate in the lungs after long term exposure and affect breathing and respiratory symptoms. The lung's natural cleansing and defense mechanisms are impaired. **Welfare:** Causes soiling and corrosion to materials. Decreases visibility by forming atmospheric haze.
Lead (Pb) The primary source for airborne Pb used to be motor vehicles but the use of unleaded gas has dramatically reduced Pb emissions.	**Health:** Causes mental retardation and brain damage, especially to children. Causes liver disease; may be a factor in high blood pressure and damages the nervous system. **Welfare:** No direct impact on vegetation.

***Note:** Ozone at the ground level can be a health and environmental problem, but ozone is beneficial in the stratosphere (30-60 miles above the Earth) where it filters out the sun's harmful ultraviolet radiation.

2. Status
a. What Is the Quality of the Air We Breathe?

How and why are trend data used?

Trend data provide a means to address the question "How has the quality of the air we breathe changed?" As reflected in the figures on the following pages, trends indicate that air quality is improving - and very substantially for some pollutants. When interpreting trends, it must be recognized that air quality is influenced by many factors. For instance, the state of the economy, as reflected by industrial and commercial activity, and the resultant levels of pollutant emissions, as well as meteorological conditions should be considered when evaluating pollution trends. In recent years, while the Massachusetts economy has been strengthening, meteorological conditions have been favorable for lower ozone levels. With meteorological conditions more conducive to ozone formation, the pollution levels could have been higher.

How does DEP approach the goal of emission reductions?

While current data trends are downward for many pollutants, DEP believes that it is necessary to maintain and improve existing emission control programs in order to maintain these levels, and to reduce them further (to attain the ozone NAAQS, for example), and at some point it may be necessary to adopt further controls. The challenge is to effectively balance the goals of continuing emission reductions while encouraging economic growth.

b. Ozone

What is the monitoring system for ozone and ozone precursors?

Photochemical Assessment Monitoring Stations (PAMS) have been put in place to collect data to measure the concentrations of ozone and ozone precursors - the chemicals which are involved in the production of ozone. Massachusetts has two PAMS networks - one composed of five sites for the Boston area, and one with two sites for the Springfield area. One of the Boston area stations, Truro also operates as part of the Providence, RI PAMS network. Information from these sites is used to develop and assess the effectiveness of state and federal regulations designed to bring Massachusetts into compliance with state and federal air quality standards.

How often is the 1-hour ozone standard exceeded?

The 1-hour ozone air quality standard is attained when exceedances of the 0.12 ppm 1-hour standard are less than or equal to 1.0 per year at a site as averaged over a three-year period. Figure 9 shows the trend from 1987 to 2000 for the number of exceedance days (i.e., days ozone exceeded the 1-hour standard of 0.125 ppm) and total ozone exceedances for all sites. The 1-hour ozone standard was exceeded at three out of the sixteen sites at which ozone was monitored during 1999 and at one of the sites during 2000. (The standard of 0.12 ppm is exceeded when the monitor measures concentrations of 0.125 ppm or greater).

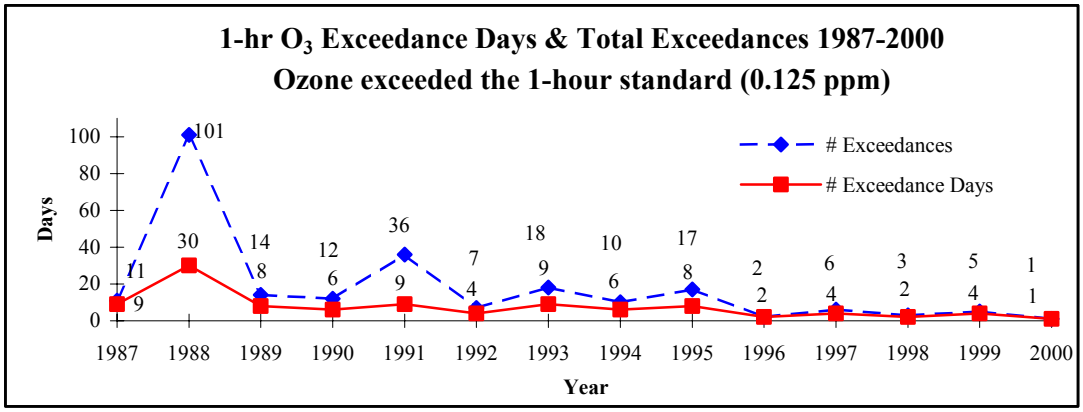


Figure 9

What has happened to peak 1-hour ozone concentrations?

Figure 10 shows that peak 1-hour ozone concentrations have generally declined during the period 1987 to 2000. Year-to-year variations in peak ozone levels are declining. Because the downward trend has persisted despite several recent hot summers, this trend appears to be the result of emissions reductions, not meteorology.

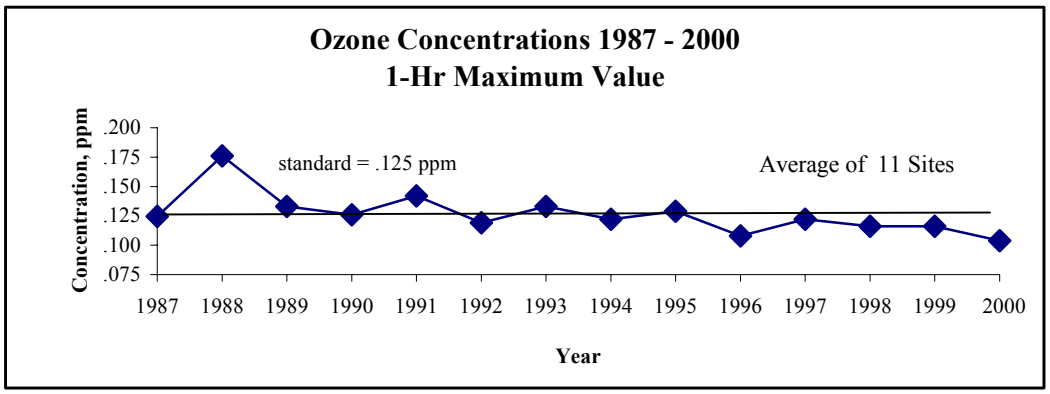


Figure 10

What is the status of the 1-hour and 8-hour ozone standards?

In July 1997, EPA revised the ozone public health standard from a 1-hour standard of 0.12 ppm to an 8-hour standard of 0.08 ppm, in light of scientific studies indicating that adverse health effects result from prolonged (6 to 8 hour) exposures to ozone at concentrations below the level of the 1-hour standard of 0.12 ppm. The 8-hour standard is designed to mitigate adverse ozone-related health effects, such as respiratory symptoms and decreased lung function. The 8-hour standard is calculated as the 3-year average of the annual fourth-highest daily maximum 8-hour ozone concentration. If this 3-year average is 0.085 ppm or greater, a site is in violation of the standard. The 8-hour standard became effective September 16, 1997.

Following the issuance of the 8-hour ozone standard, EPA revoked the one-hour standard for Eastern Massachusetts. However, in May 1999, a federal court decision prevented EPA from enforcing the new 8-hour standard. In July 2000, EPA reinstated the 1-hour standard, effective as of January 1, 2001. Both Eastern and Western Massachusetts are currently still designated as nonattainment for the 1-hour ozone standard and remain subject to that standard.

In March, 2001 the U.S. Supreme Court upheld the 8-hour ozone standard but remanded the standard back to the lower court to consider issues regarding implementation.

Figure 11 shows the number of 8-hour ozone exceedance days and total exceedances from 1987 to 2000 in Massachusetts. EPA originally intended to use data from 1997 through 1999 to determine Massachusetts' attainment status for the 8-hour ozone standard, but may use later data in light of delays in implementation of the 8-hour standard. The 8-hour standard was violated at 10 monitoring sites during the 1997-99 period and at 7 sites during the 1998-2000 period, in both Eastern and Western Massachusetts.

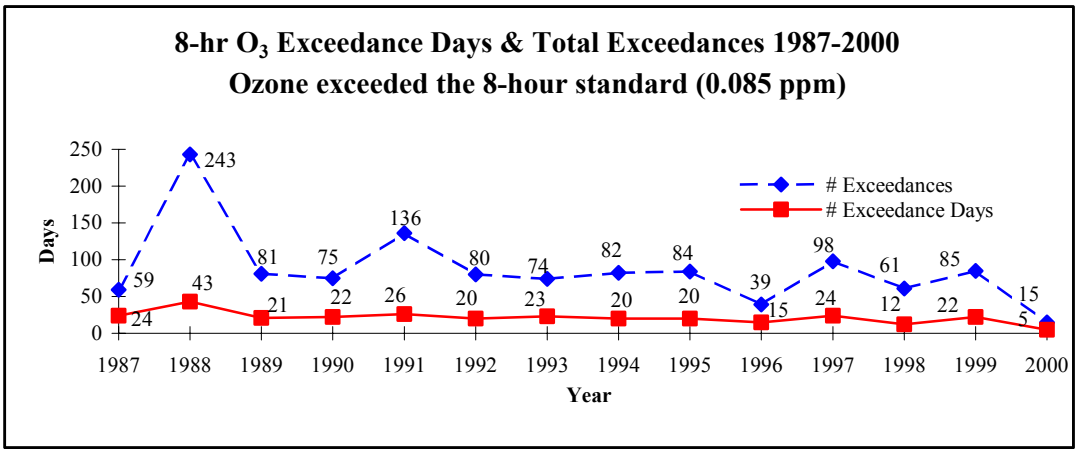


Figure 11

What is the level of transported pollution?

Ozone is a transported pollutant that is not necessarily confined to a localized geographic area. Once formed, it may travel hundreds of miles and then mix with local emissions in another area, thus contributing to a pollution problem downwind. Figure 12 shows ambient 1-hour ozone concentrations in Massachusetts and the upwind and downwind New England states for the period 1987 to 2000.

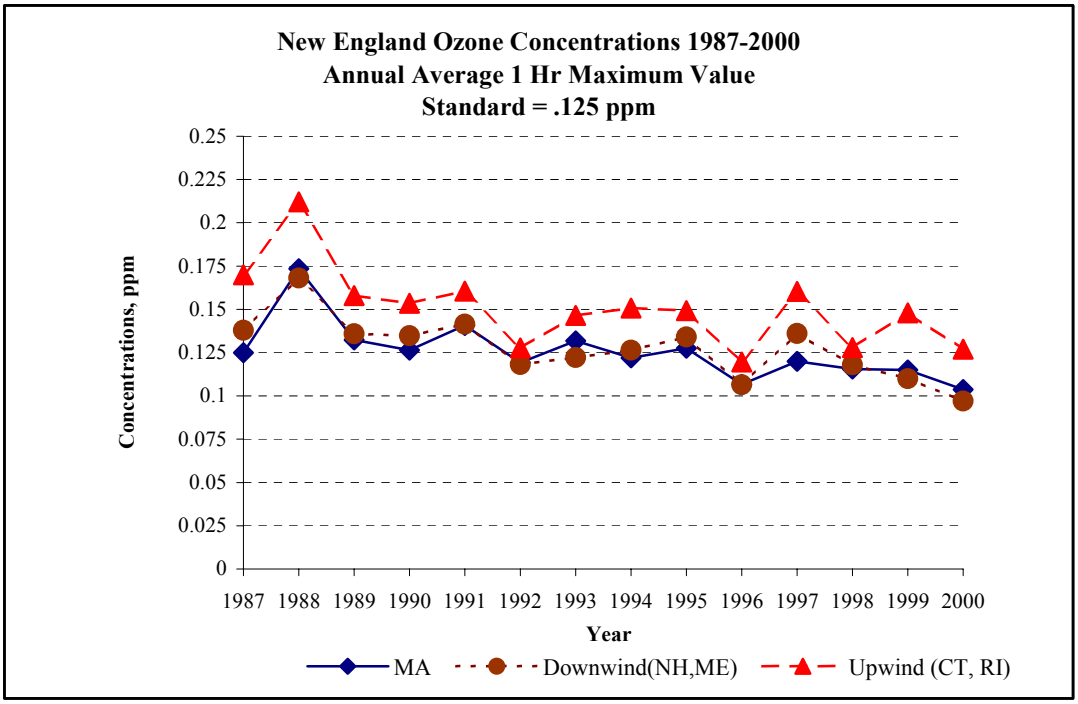


Figure 12

What actions have been initiated to limit transport?

A number of actions have been initiated recently at the state, regional and federal levels to address the issue of ozone and precursor transport. In August 1997 Massachusetts filed a petition with EPA under Section 126 of the Clean Air Act. The petition asked that EPA require NO_x emission reductions from 40 specific power plants in the Midwest that contribute to non-attainment in Massachusetts. Other states in the Northeast have also filed similar petitions under Section 126. On a regional level, the Northeast states in the Ozone Transport Region (12 states from Northern Virginia north to and including Maine, and the District of Columbia) are moving forward with NO_x reductions from power plants in 1999, with additional reductions occurring in 2003. At the federal level, in September 1998, EPA issued the "NO_x SIP Call" requiring NO_x reduction in a 22-state region covering the Eastern US. Recent court decisions have upheld the majority of the requirements of the SIP Call, but stayed the compliance deadline until May 2004. EPA also recently finalized additional NO_x and VOC reductions on a national level from mobile sources (Tier II/low sulfur gasoline) that will yield significant air quality benefits within the next 5 to 10 years.

What is the trend for violations of the one-hour ozone standard? Why is that significant?

Figure 13 shows the trend for the number of ozone sites in violation of the 1-hour ozone standard. A site is in violation when the exceedances of the 0.12 ppm 1-hour ozone standard are greater than 1.0 per year, averaged over a three-year period. Although the number of violation sites has decreased over the past ten years, exceedances of the ozone standard still occur. In 1998, in Western Massachusetts, there were three days the 1-hour standard was exceeded and one site was in violation by having a three-year average of exceedances greater than 1.0 per year. In 1999 there was one day when the 1-hour standard was exceeded in Western Massachusetts and three days when the standard was exceeded in Eastern Massachusetts. In 2000, there was only one day when the 1-hour standard was exceeded. Because ozone concentration are dependent on weather conditions, it is likely that 1-hour exceedances are likely to continue to occur from time-to-time.

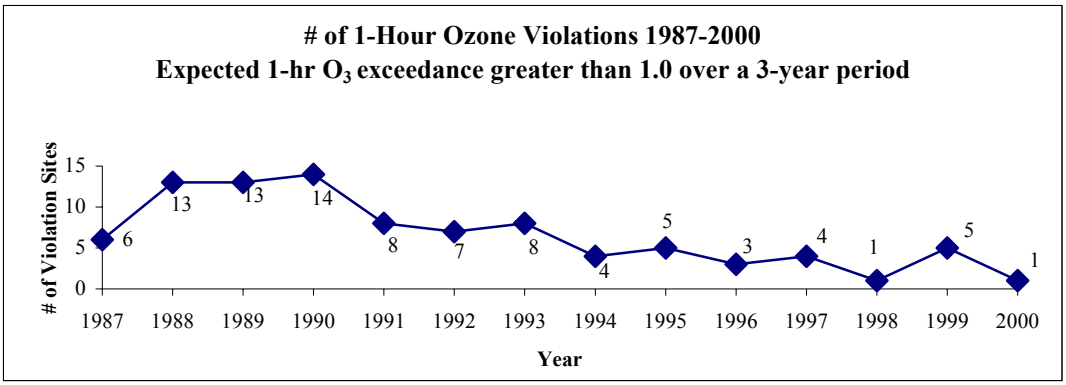


Figure 13

What is the trend for NO_x concentrations?

Oxides of nitrogen (NO_x) are key compounds in the production of ozone in the troposphere (i.e., the lower atmosphere which we breathe). Figure 14 shows the concentrations of nitrogen dioxide (NO_2), one of the oxides of nitrogen, averaged from measurements from DEP sites operational during the period 1989 to 2000. NO_2 is a criteria pollutant regulated under the Clean Air Act (see Part 4 for other criteria pollutants). A downward NO_2 trend is indicated.

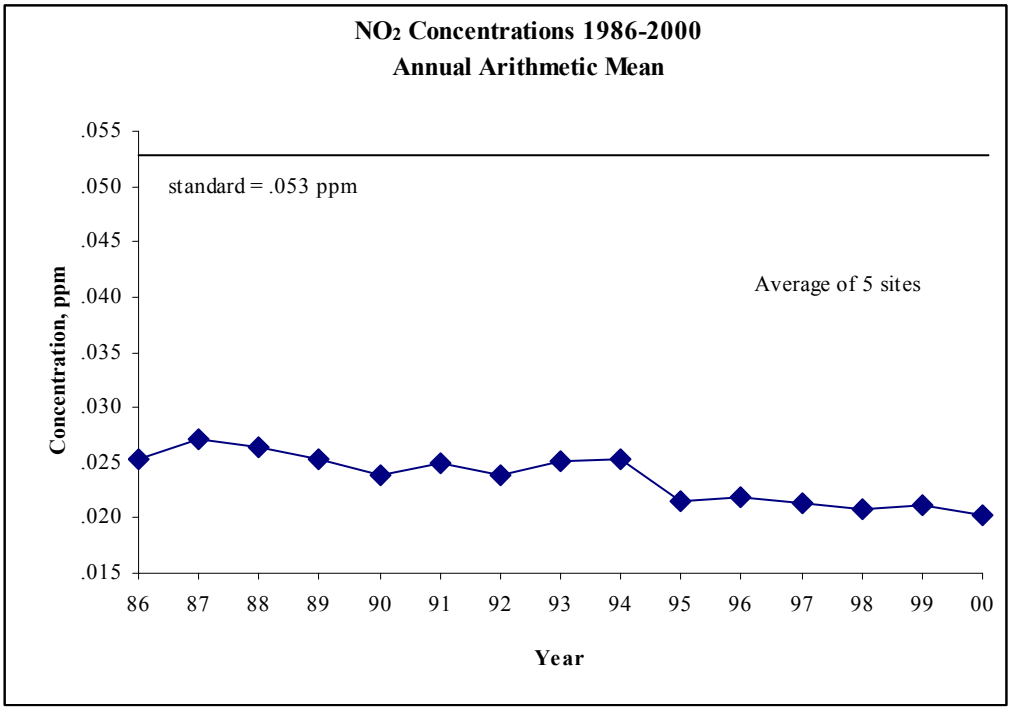


Figure 14

Is Massachusetts meeting the one-hour ozone standard? Why is that significant?

Both Eastern and Western Massachusetts are classified as being in "serious" nonattainment of the one-hour ozone standard. Western Massachusetts has had exceedances of the one-hour standard in recent years, but did not violate the standard during the 1998-2000 and 1999-2001 time periods. Eastern Massachusetts had not violated the standard since 1996. However, with more than 3 exceedences during the 1999-2001 period, Eastern Massachusetts is in violation of the standard again.

The public ambient air monitoring network, established to assess the ozone problem through field measurements, cannot measure ozone in every location in the Commonwealth. It is designed to capture values in areas that are representative of the problem, area-wide.

The monitoring data for the period 1987 to 2000 indicate a downward trend in one-hour ozone values, number of one-hour ozone exceedances, and number of violations. The trend has been relatively stable, except for 1988 when meteorological conditions contributed to a high number of exceedances of the one-hour ozone standard.

c. Criteria Pollutants Emissions Inventories

What are the emission performance trends from 1990 to 1999?

Emissions trends are presented for four major pollutants of concern: volatile organic compounds (VOC), nitrogen oxides (NO_x), sulfur dioxide (SO_2) and carbon monoxide (CO). Emissions data are not available for particulates and lead. The emission trends cover the period of 1990 to 1999. Massachusetts is required to submit periodic emissions inventories for inclusion in its State Implementation Plans to EPA for VOCs, NO_x and CO.

One initial SIP requirement was a 1990 base year emissions inventory for ozone precursors and CO, from which control programs were developed. Emission inventories are required to be submitted every three years to EPA. The 1990, 1993, 1996 emissions estimates, were submitted to EPA as part of the SIP process. The 1999 periodic emissions inventory is still under development and emissions reported here reflect preliminary estimates.

Sulfur dioxide emissions are tracked annually by DEP because of the requirements of the 1985 State Acid Rain (STAR) program. The STAR program is more stringent than the national program because it imposes an emissions cap of 412,000 tons, which is based on the average annual emissions during the four year period of 1979 - 1982. If this cap is exceeded, DEP is required to implement additional control measures. The SO_2 cap has never been exceeded in the state since the inception of the STAR program. The SO_2 emissions for 1999 were 148,000 tons, less than one-half of the cap.

What are the point source emission trends from 1990 to 1999?

The point source section of the inventory comprises the large industrial emitters and is the only category for which actual data are available for all nine years. The point source emissions are presented in Figure 15 and Figure 16 on the next page. The electric utility emissions (Figure 17 on the next page) are presented because they comprise the major proportion of NO_x and SO_2 point source emissions.

Definitions for sources of pollution described in Figures 15 through 19.

Point:	A larger source of air pollution, primarily from smokestacks at manufacturing and power plants.
Area:	Small point sources too numerous to measure individually, such as those found in gas stations, dry cleaners and consumer products. Taken in the aggregate they may cause a great deal of pollution.
Mobile:	Common on-road vehicles such as autos, trucks, motorcycles and buses.
Non-Road:	Engines that are usually not operated on a road, such as construction equipment, boats, snowmobiles, lawnmowers, etc.

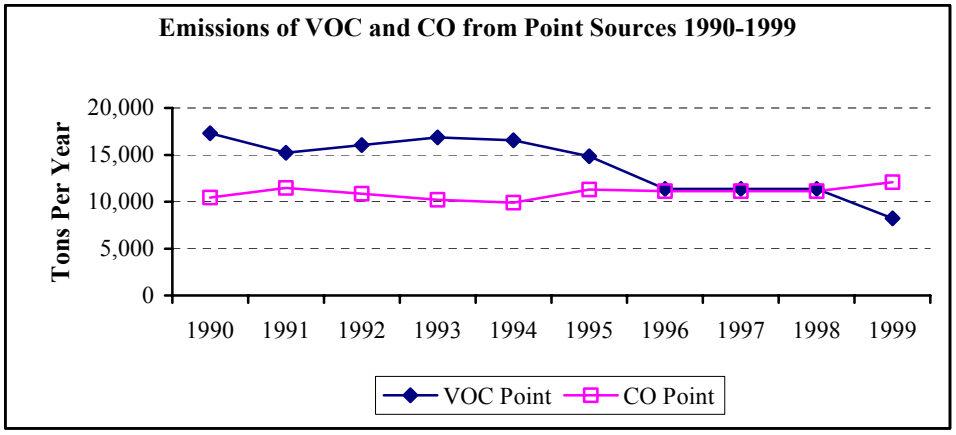


Figure 15

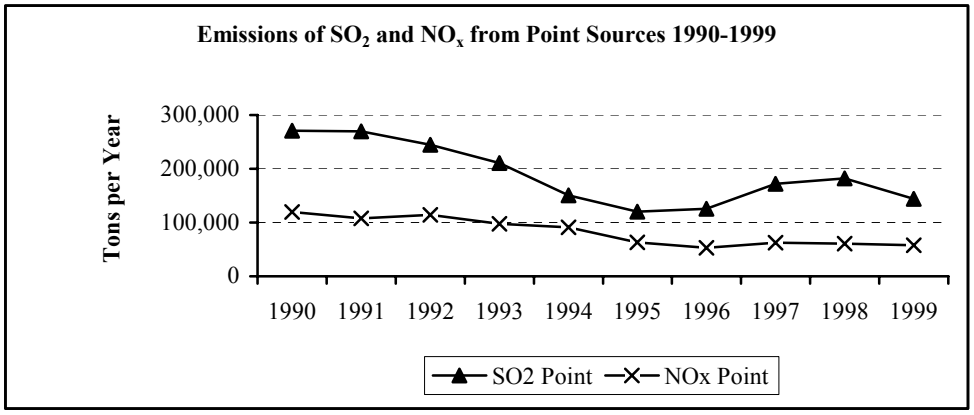


Figure 16

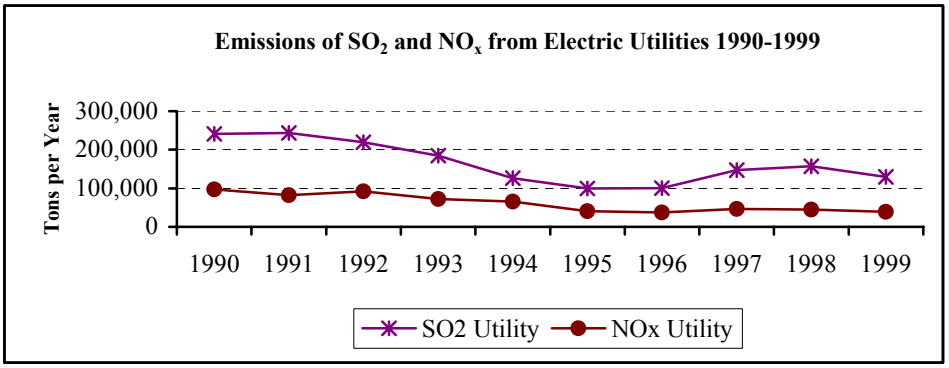


Figure 17

What is the reduction in Total VOC Emissions?

Total VOC emissions were reduced from 986 tons per summer day (TPSD) in 1990 to 748 TPSD in 1999 (Figure 18). This 24% reduction was projected to occur net of economic and industrial growth, and is based on the 1990 to 1999 controls that DEP expected to implement to meet the first set of milestone reductions required under the 1990 Clean Air Act Amendments.

The 1999 emission estimates for VOC and other precursors are based on projected controls from all programs that were included in the Reasonable Further Progress SIP revision, which required reductions by 1996. Although implementation of the Enhanced Inspection and Maintenance Program for motor vehicles began in December 1999, the 1999 emissions do not reflect reductions from this program.

The emission reductions are also attributable to other control measures such as: Federal Motor Vehicle Control Program (FMVCP); California Low Emission Vehicle Program (LEV); Reasonable Available Control Technology (RACT) corrections for point sources; Stage II vapor recovery for gasoline stations; reformulated paints and consumer products; and reformulated gasoline.

Overall, there is a general reduction in emissions for all four pollutants from 1990 to 1999, even though there has been significant growth in population and economic activity and vehicle miles traveled in Massachusetts. Based on preliminary 1999 estimates, the estimated reductions in total statewide emissions for each of the following pollutants from 1990 to 1999 are:

VOC.....-24% (see Figure 18)
NO_x.....-6% (see Figure 19)
SO_2.....-46%
CO.....-21%

Note that 1999 emissions for VOC, NO_x, CO, and SO_2 are preliminary estimates. Actual emissions are reported in periodic emissions inventories that are developed every three years. Critical data to develop the inventory are not compiled and released (e.g., State Energy Data Reports and County Business Patterns) until one to three years after the end of the calendar year analyzed.

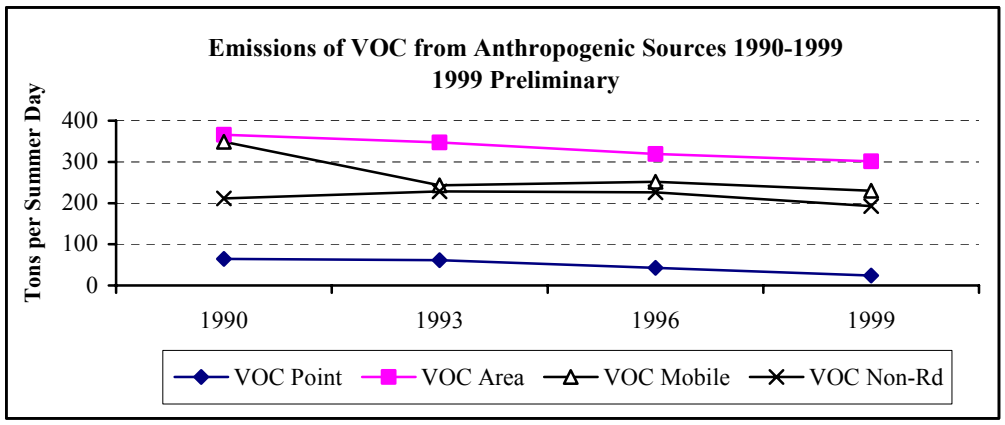


Figure 18

What is the reduction in total NO_x emissions?

NO_x emissions (Figure 19) have been reduced from 1,014 TPSD in 1990 to 950 TPSD in 1999 based on the preliminary 1999 inventory estimates. This 6% reduction is attributable to point sources. Point source emissions, primarily electric utilities, were reduced by 44% for this period. Area, mobile, and non-road emissions increased by 6%, 8%, and 17% respectively. The increase in mobile emissions is attributable to the 15% increase in vehicle miles traveled. Also, the 1990 to 1999 area and mobile source controls targeted VOC emissions, and therefore had little effect on NO_x emissions. NO_x controls for mobile sources have been put in place more recently, and their effect will be reflected as the vehicle fleet turns over.

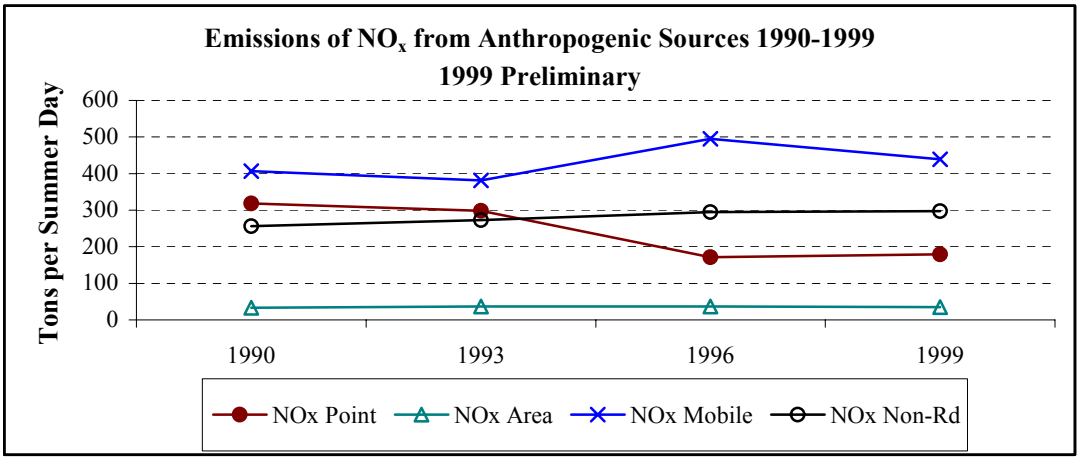


Figure 19

What is the reduction in on-road mobile source emissions?

Reductions of on-road mobile VOC emissions are shown (Figure 20) with a contrasting increase in daily vehicle miles traveled (DVMT). The increase in mobile NO_x emissions is due to the fact that controls in the past have been targeted at VOC reductions. Mobile source NO_x controls were put in place recently and reductions should occur with vehicle fleet turnover. The increase in DVMT is also responsible for emissions increases. The projected emissions from 1990 to 1999 are:

VOC.....-34%
NO_x .....+8%
DVMT.....+15%

On-Road Mobile Emissions and Daily Vehicle Miles Traveled 1990 – 1999 (1999 preliminary)

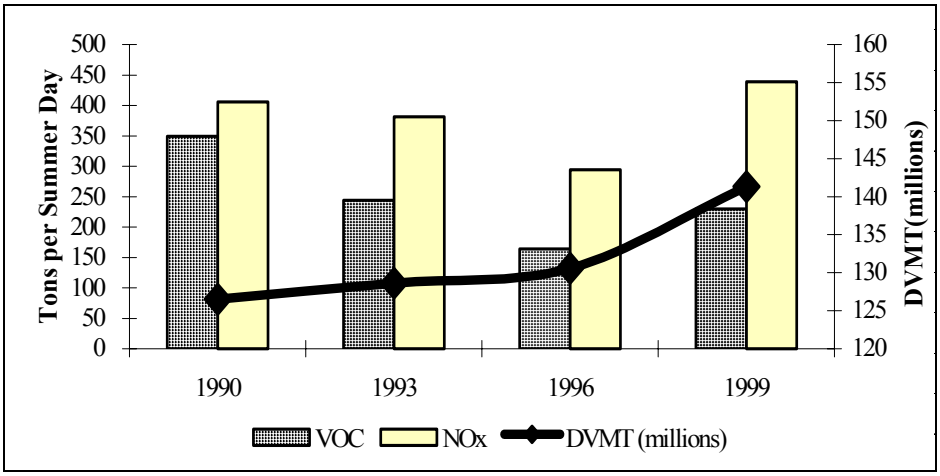


Figure 20

d. Monitoring of Criteria Pollutants other than Ozone.

What is the trend for carbon monoxide?

The trend for carbon monoxide (CO) displayed in Figure 21 fluctuates but is clearly in a downward direction. CO, as indicated by the 8-hour 2nd maximum concentration, has decreased by 54% in the period indicated below. CO concentrations and statewide emissions have greatly decreased because of implementation of controls on vehicles by DEP and EPA, even though CO emissions have increased slightly from point sources. While it is always possible that extraordinary circumstances may cause a local condition to result in a violation of the carbon monoxide standard, monitored data supports the premise that the entire state of Massachusetts is below the standard. The Boston area was designated "attainment" on January 30, 1996. Massachusetts has submitted a request to EPA to re-designate to "attainment" the Waltham, Lawrence, Worcester and Springfield areas. With this request, the entire Commonwealth will be in attainment of the CO standard.

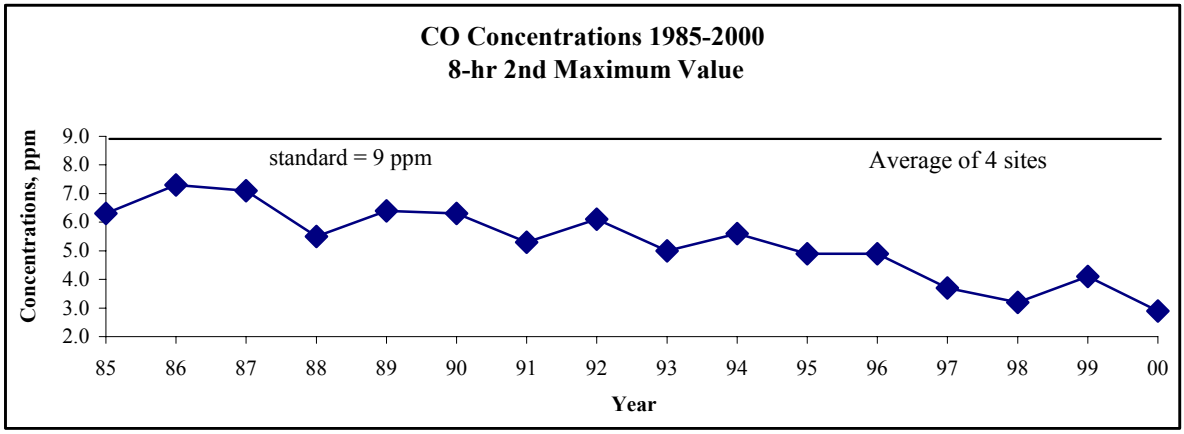


Figure 21

What is the trend for nitrogen dioxide?

The trend for Nitrogen Dioxide (NO_2) shown in Figure 22 is downward. The annual mean concentration has decreased 20% in the period indicated below. Massachusetts attains the NO_2 standard.

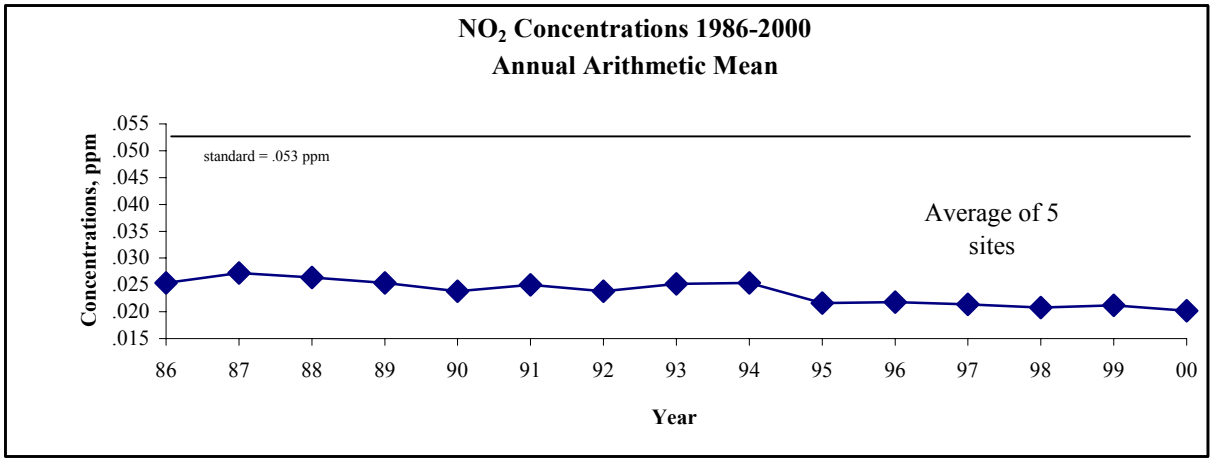


Figure 22

What is the trend for sulfur dioxide?

Figure 23 indicates a downward trend in sulfur dioxide (SO_2) with the annual mean concentration decreasing 38% over the period indicated below. The slight increase over the past few years may be attributed to an increase in fossil fuel-fired operations, or changes in local or regional meteorology. Massachusetts attains the SO_2 standard.

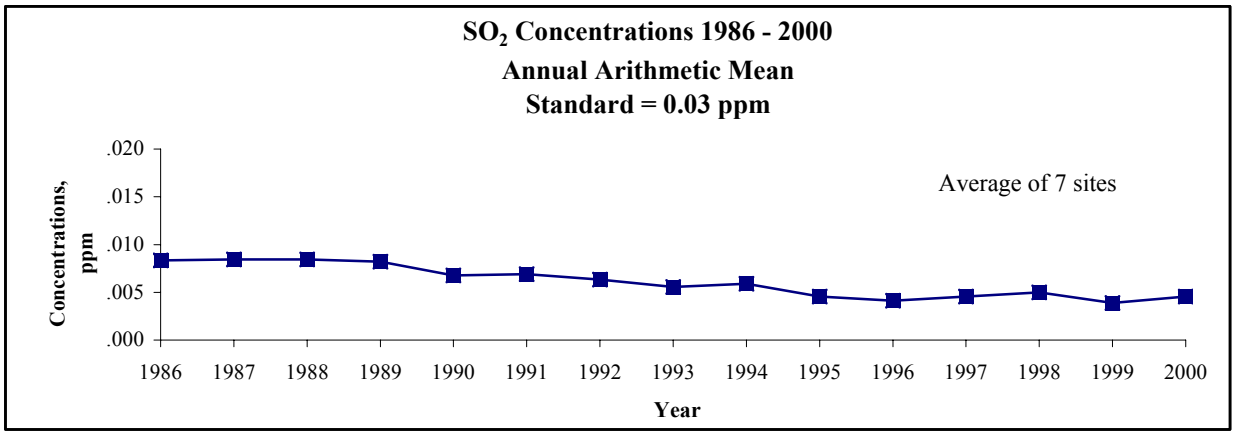


Figure 23

What is the trend for particulate matter?

The PM-10 trend shown in Figure 24 is downward. PM-10 concentrations have decreased 21% over the period indicated below. Massachusetts attains the PM-10 standard.

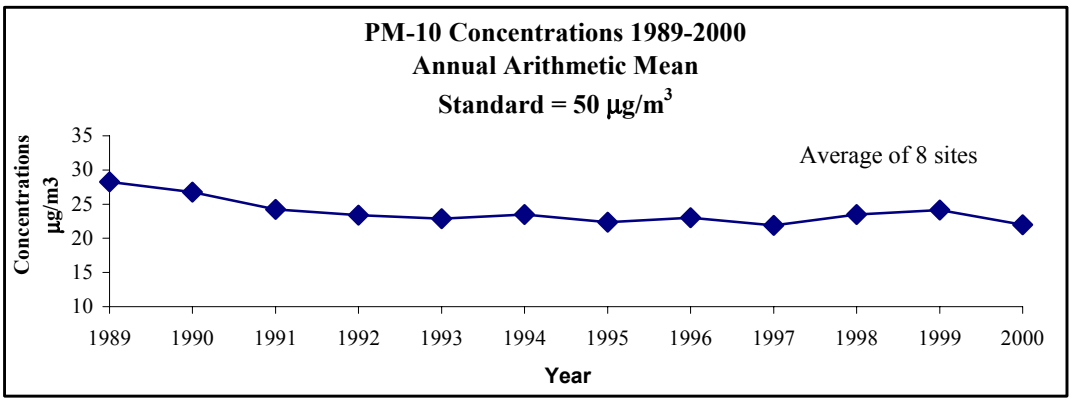


Figure 24

What is the trend for particulate matter? (continued)

Figure 25 shows trends indicating a decrease in PM-10 in Massachusetts in the last decade, and also in the New England states, which are upwind and downwind from Massachusetts.

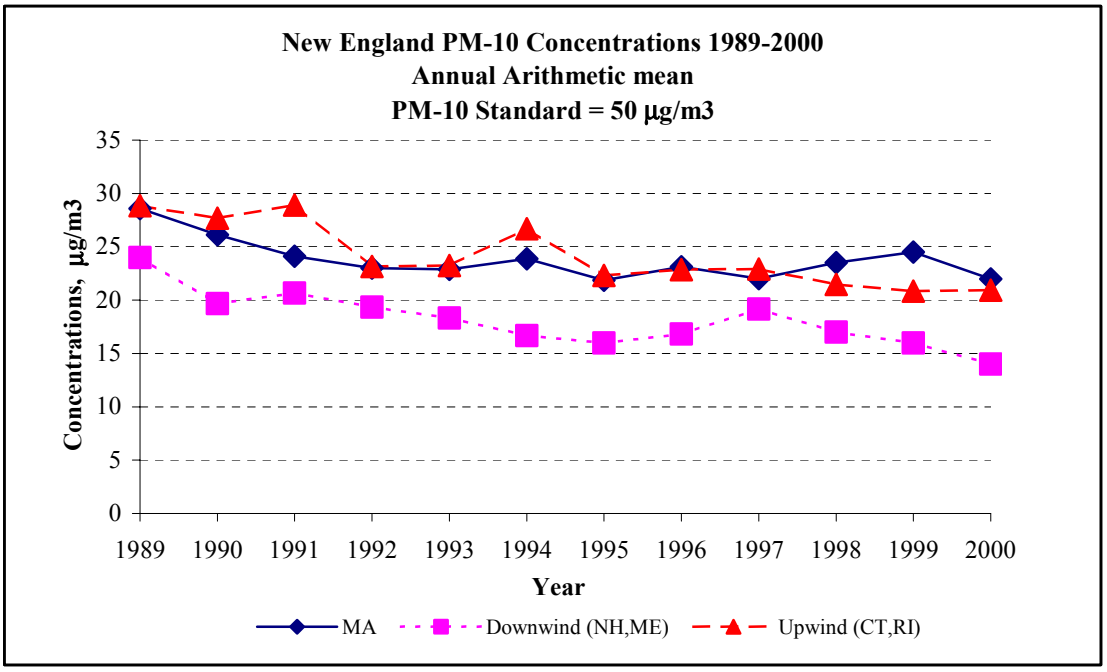


Figure 25

What is the trend for lead?

Lead (Pb) as an air contaminant has been virtually eliminated as an ambient air problem. This is most directly due to the elimination of tetraethyl lead as a gasoline additive. Data from 1993 through 1995 are reporting levels at the lower detectable limit of our analysis. The actual lead in air concentrations could therefore be less. As Figure 26 indicates, the concentration of lead in the air decreased dramatically over the period 1986 to 1995. Lead sampling was discontinued in 1995, but was reestablished at one site in 1998. Concentrations at that site, in Boston, are well below the standard.

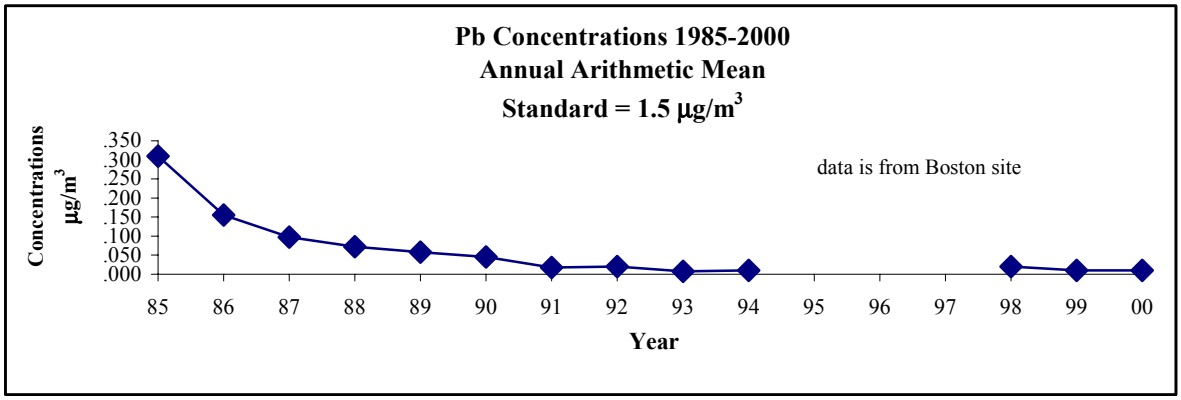


Figure 26

e. Emissions and Deposition of Toxic Air Pollutants

What are toxic air pollutants?

Toxic air pollutants are pollutants that, at sufficient concentrations and exposure, are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or to cause adverse environmental effects. Generally, the toxic air pollutants of greatest concern are those that are released to the air in amounts large enough to create a risk to human health, and have the potential to expose many people.

Title III of the Clean Air Act Amendments identified 188 hazardous air pollutants (HAPs). The 188 HAPs consist of toxic air pollutants likely to have the greatest impact on ambient air quality and human health even when their emissions are controlled through available technology. The list of HAPs regulated by EPA is published in Section 112 of the 1990 Clean Air Act.

Toxic air pollutants may exist as particles or vapors. Examples of gaseous toxic air pollutants include: benzene, toluene, and xylenes, which are found in gasoline; perchloroethylene, which is used in the dry cleaning industry; and methylene chloride, which is used as a solvent by a number of industries. Examples of air toxics typically associated with particles include: heavy metals such as cadmium, mercury, chromium, and lead compounds; and semivolatile organic compounds such as polycyclic aromatic hydrocarbons (PAHs), which are generally emitted during the combustion of wastes and fossil fuels.

What are the effects of toxic air pollutants?

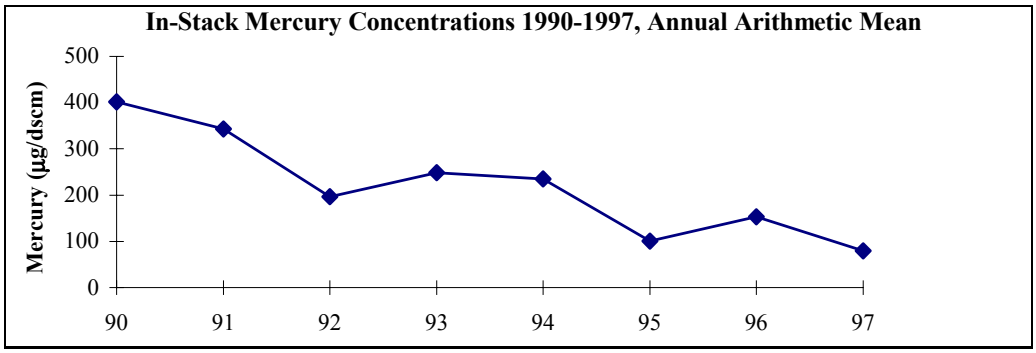
Toxic air pollutants can have serious effects on human health and the environment. Human exposure to these pollutants can include short-term (acute) and long-term (chronic) effects. Many factors can influence how different toxic air pollutants affect human health, including the quantity to which a person is exposed, the duration and frequency of the exposure, the toxicity level of the pollutant, and the person's overall health and level of resistance or susceptibility. Short-term exposures can include effects such as eye irritation, nausea, or difficulty in breathing. Long-term exposures may result in damage to the respiratory or nervous systems, birth defects, and reproductive effects. In addition, certain toxic air pollutants can have indirect effects on human health through deposition onto soil or into lakes and streams, potentially affecting ecological systems and, eventually, human health through consumption of contaminated food.

What toxics monitoring does the DEP do?

DEP collects 24 hour air samples in Summa type canisters at two locations, the Roxbury and Long Island monitoring stations. These canisters are sent to the Rhode Island DPH where they are analyzed for a number of urban air toxics. In addition, DEP has applied for a 103 National Air Toxic Monitoring grant that would allow DEP to contract with a consulting firm for the analysis of existing PAMS data, for toxics data information, as well as to offer assistance in the development of future toxic monitoring efforts.

Why is mercury in the environment such a concern? What is the trend for mercury?

Mercury is of great concern to DEP because it has been spread widely throughout the environment, does not decay, and can travel up the food chain to potentially cause very serious health effects in children and adults who are exposed. It is released into the atmosphere by various sources, including facilities that burn fossil fuel, municipal waste combustors, and medical waste incinerators. Municipal waste combustors were the largest source of mercury emissions in Massachusetts through the 1990's. Figure 27 shows the in-stack concentration from Massachusetts facilities over the past seven years. The figure shows a downward trend of mercury over time. This in part is attributable to recycling programs and less mercury in products.



µg/dscm = micrograms per dry standard cubic meter

Figure 27

What steps is DEP taking to control mercury emissions?

DEP has developed a comprehensive mercury reduction and elimination strategy. Addressing air emissions through pollution control equipment is one core DEP strategy. The air-related regulations are described below in this section. The second core of the strategy is pollution prevention. This includes diverting mercury out of the waste stream through means such as recycling and source substitution. Massachusetts is also a signatory to the New England Governors and Eastern Canadian Premiers *Mercury Action Plan*, and intends to meets the goals of that plan.

For additional information on DEP's mercury pollution prevention programs in Massachusetts, please refer to Prevent and Manage Waste Goal #2, Pollution Prevention.

Section 129 of the 1990 Clean Air Act Amendments required EPA to promulgate emission limits to control mercury, cadmium, lead and other pollutants from municipal waste incineration units. Those emission limits were promulgated in December 1995. To implement these limits, DEP promulgated a regulation [310 CMR 7.08(2)] in August, 1998 to control emissions from municipal waste combustors. It sets a mercury standard almost three times more stringent than the federal standard. Municipal waste combustors had until December 2000 to install controls. With these new controls installed on the incinerators, stack emissions of toxic chemicals, in particular of mercury, have been significantly reduced. Preliminary monitoring data indicates that mercury emissions have been reduced by more than 90%. DEP is planning to promulgate regulations for medical waste incinerators in the fall of 2001. These regulations will also be more stringent than federal requirements. The number of medical waste incinerators in Massachusetts has substantially decreased through mergers, closures of hospitals and other facilities, and use of alternative sterilization technologies. A pre-1994 inventory counted upwards of 212 permitted facilities. Currently, the 2000 inventory stands at approximately 4 facilities, down from 23 in 1998.

What has DEP done to monitor mercury?

A special mercury air deposition monitoring program was established in coordination with EPA and NESCAUM at the Quabbin Reservoir in June 1997. Particulate mercury, wet deposition mercury, and elemental mercury were measured at the Quabbin monitoring site. The measured values will provide us with information on the amount of mercury deposition into this waterbody. A program report will be forthcoming. During the spring of 2001, DEP established two additional mercury monitoring stations. These stations are located in North Andover and Lakeville. Collected samples are sent to the University of Michigan for analysis. DEP's strategic monitoring program for mercury was expanded in 2000 to include a long-term monitoring plan of mercury in fish and other biota, water, and sediments from selected waterbodies from across the state. Mercury levels in wastes are also being monitored through the testing of "inlet" (pre-pollution controls) gases at municipal solid waste combustors.

What are mercury levels in freshwater fish?

Massachusetts has surveyed contaminants in freshwater fish since 1983, focusing primarily in areas of known or suspected contamination, or where biological effects were observed. These studies have shown that the variation in fish mercury contamination is relatively high in surface waters. Based on over 1,300 fish samples which have been tested, the overall mean mercury concentration is 0.36 parts per million (ppm) of mercury. The range of this mean is nondetectable to 5.0 ppm. An alternative range is 0.01 to 2.3 ppm when the single outlier of 5.0 ppm and the single nondetectable level are not included in the data set. The nondetectable level for mercury in the Massachusetts data comes from the early set, when mercury analysis was a relatively new technique. The high value of 5.0 ppm is derived from a fish taken from a waterbody that was contaminated with mercury from a hazardous waste site.

The state running average concentration of mercury of 0.36 ppm in freshwater fish represents all the fish that have been tested. These fish vary in size and species. Bass and yellow perch typically have higher mercury concentrations than the bullhead. Over 40% of the waterbodies tested have one or more species of fish with mercury levels high enough to render them unsafe. Based on the test results, the Massachusetts Department of Public Health (MA DPH) has issued over 100 freshwater fish consumption advisories for specific waterbodies. In addition, MA DPH has issued a statewide health advisory cautioning pregnant women, women who may be pregnant, nursing mothers and children under 12 to avoid eating fish from Massachusetts freshwater bodies, excluding stocked and farm-raised fish, and several species of saltwater fish.

In May 1997, DEP published a study entitled *Fish Mercury Distribution in Massachusetts Lakes*, which explored factors which might account for variation in fish mercury concentrations such as ecological subregions, fish species, lake productivity, trophic status, etc. This study found that bottom-feeding brown bullhead generally had the lowest mercury concentrations (mean = 0.14 ppm; range = 0.01 - 0.79 ppm); yellow perch (mean = 0.31 ppm; range = 0.01 - 0.75 ppm) had higher levels and largemouth bass had the highest concentrations (mean = 0.40 ppm; range = 0.05 - 1.1 ppm). Mercury concentrations measured in yellow perch and largemouth bass were consistent with those of similarly aged fish in the Adirondack Mountains of New York State, the Upper Peninsula of Michigan and Wisconsin. The largemouth bass concentrations were less than those of this species in Florida.

What are mercury levels in freshwater fish? (continued)

Another important finding of the study was the differences in fish mercury concentrations between ecological subregions in Massachusetts. Regionally, the Narragansett/Bristol Lowlands subecoregion and the Green Mountain/Berkshire Highlands subecoregions had somewhat lower mercury in all species than those from the Worcester Monadnock Plateau subecoregion (Figure 28).

Mercury Levels in Fish
(samples collected in the fall of 1996)

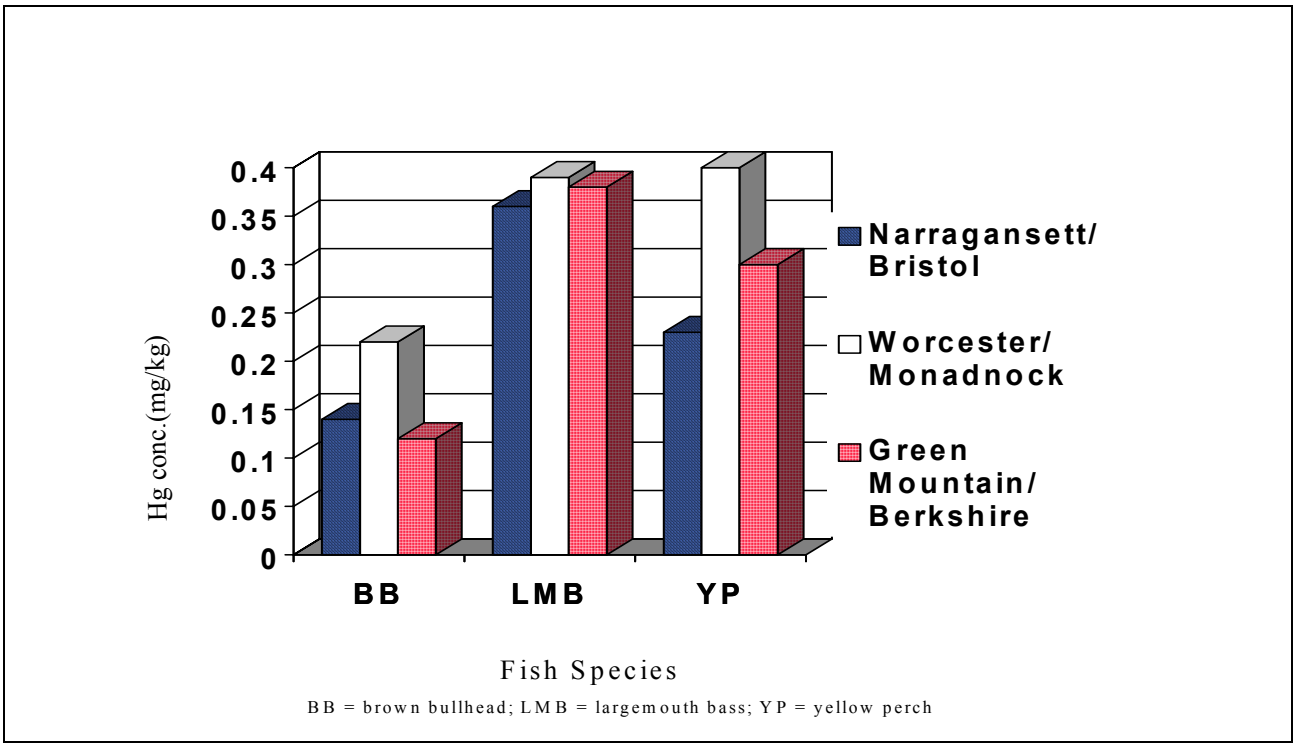


Figure 28

What is the Merrimack Valley Fish Study?

In 1997, a sophisticated computer model was used by the US EPA to predict the rate at which mercury is deposited from the air onto land and water surfaces across New England. The model predicted elevated mercury deposition in an area extending from the Merrimack River Valley of Massachusetts into southern New Hampshire and Maine. The model assessed mercury-bearing emissions from sources outside of New England (e.g., coal-fired utilities in the Midwest) and within the region (e.g., municipal waste combustors, medical waste incinerators, and other combustion facilities).

Based on these modeling predictions, as well as numerous public requests for additional fish sampling in the Merrimack River Valley, DEP expanded its ongoing fish testing program to include a regionally targeted research study in 1999. This study of 25 water bodies was primarily to determine if new fish consumption advisories and additional public outreach were needed in the region. DEP will also use the data on mercury levels in fish as an environmental indicator for assessing the long-term impacts of ongoing state and regional efforts to reduce mercury emissions.

In July 1999, the findings of the study led the MA DPH to issue freshwater fish consumption advisories for 21 waterbodies in the Merrimack Valley and for one for a waterbody in another location.

DEP is continuing to evaluate the data to compare levels in the state with other regions in the state and determine if there are spatial patterns in fish mercury concentrations within the predicted high deposition zone. In addition, DEP will use the data from this study to evaluate the accuracy of a model it developed in 1996 to predict mercury levels in fish based on measures of water quality. Follow-up monitoring of selected lakes included in the study is occurring to improve the information on seasonal and long-term fish mercury trends.

What is the most recent air toxics data from DEP's Photochemical Assessment Monitoring Station?

Figure 29 shows ambient concentrations for 1994 - 2000 from the PAMS (Photochemical Assessment Monitoring Station) site located in Lynn for benzene, toluene, ethyl benzene and xylenes. The concentration results are from 24-hour samples taken throughout each year. The figures list the allowable ambient limits (AALs) which are state health protection guidelines for long term exposures. The ambient concentrations of these compounds are well below the AALs except for benzene. However, the benzene levels have significantly decreased over the six-year period, which is likely the result of control strategies that have been implemented. These include reformulated gasoline and the adoption of the California Low Emission Vehicle Program.

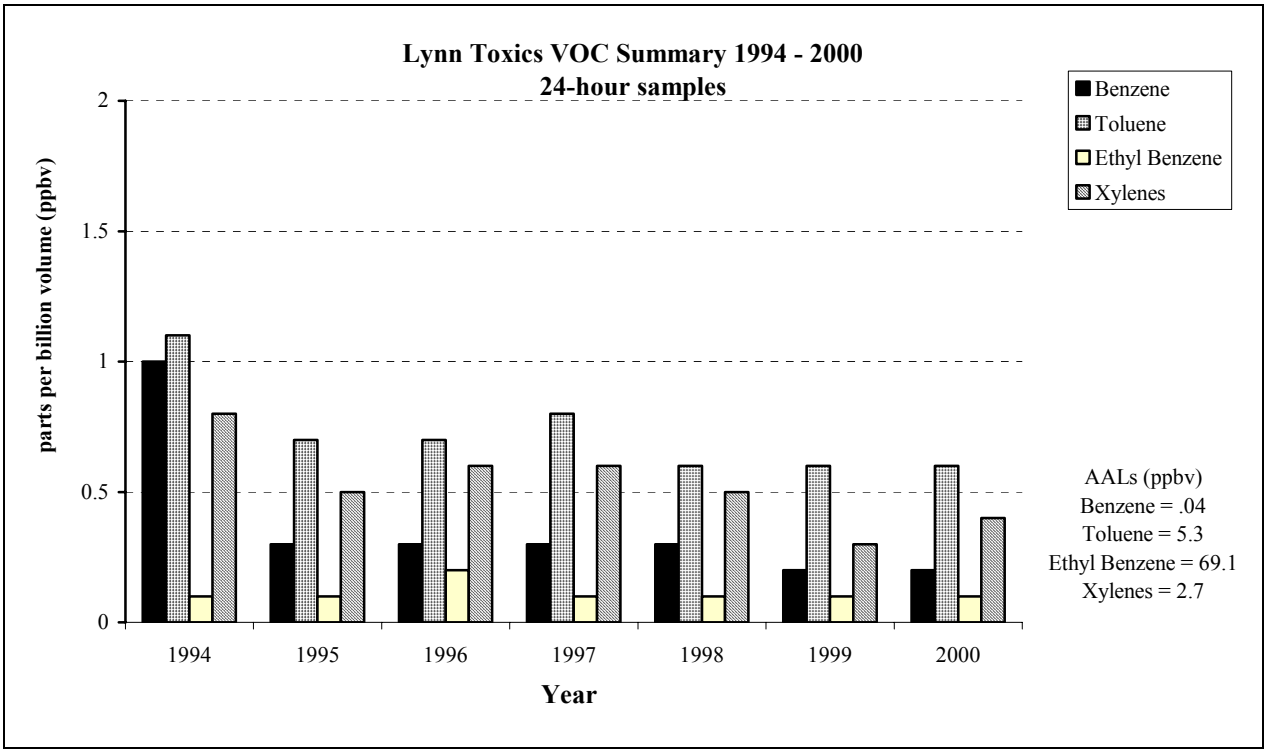


Figure 29

3. Program to Protect Air Resources

What are DEP's programs to protect air resources?

DEP is committed to the protection of Massachusetts' air quality resources and reducing the public's exposure to air pollution from sources located within and outside the Commonwealth. DEP concentrates on controlling ambient emissions of air pollutants (including emissions of toxic compounds) from stationary sources (e.g., industrial) and mobile sources (e.g., automobiles) that contribute to violations of federal ambient air quality standards. These standards are set to protect public health.

Working under the mandates of the federal Clean Air Act, DEP develops and uses environmental monitoring, air modeling, emissions inventories, source databases, planning and education tools, tracking mechanisms, permitting, compliance and enforcement to ensure environmental protection.

The regulatory framework for air quality is found at 310 CMR 6.00 through 8.00 and 310 CMR 60.00. Key measures include:

- Controls to cut emissions from large utility and factory boilers
- Cleaner products, such as reformulated household cleaners, paints, stains, and other consumer products
- Controls to reduce emissions from auto body painting operations and landfills
- Cleaner vehicles through new car standards
- Cleaner fuels
- Vehicle testing and maintenance, and
- Reducing the growth in miles driven and vehicle trips.

4. Challenges for 2002 – 2003

What are the air quality challenges for the next two years?

The challenges for 2002-2003 include:

- In late summer of 1998, due in part to community concerns, DEP began an extensive effort to examine options to address cumulative exposures. This includes defining what cumulative exposure might mean across DEP. To date, DEP cumulative exposure assessments have only addressed the aggregate impacts of air emissions. Citizens groups have requested that we begin to consider multimedia impacts (e.g., from air, water, and soil). DEP has established a multi-bureau workgroup that is discussing the state of the science, data availability, and options and opportunities to move the issue and science forward. Pursuant to Interim Guidance for Solid Waste Facility Siting issued in 2001, DEP will be analyzing cumulative air exposure in the vicinity of solid waste facilities that seek a permit for siting or operation.

- Since October 1999, DEP has been testing gasoline powered light and heavy duty motor vehicles for excess emissions using a transient test similar to IM240. The program enjoys widespread acceptance by the public, inspection stations and repair facilities. In February 2001, DEP expanded the Enhanced Emissions and Safety Test to include the testing of heavy duty diesel vehicles for excess emissions. In the coming years DEP will concentrate on implementing onboard diagnostic testing (OBD) testing and ensuring that the highest emitting vehicles continue to be accurately identified and repaired.

- DEP also will expand its efforts to reduce diesel pollution by developing a comprehensive diesel pollution prevention strategy. Primarily focusing on mobile sources, this strategy will allow DEP to better concentrate its existing and future diesel pollution prevention efforts within the agency and better coordinate those efforts with other stakeholders and interests, including EPA.

- EPA and states, including Massachusetts, are faced with the question of when and how they will implement the more protective 8-hour ozone standard, which is still being litigated in the federal courts. Questions remain as to how federal requirements and policies under the one-hour ozone standard mesh with those under the eight-hour standard, and to what extent Massachusetts may need to adopt control measures to achieve additional reductions to attain and maintain the one-hour ozone standard.

What are the air quality challenges for the next two years? (continued)

- DEP must begin assessing what controls may be needed to attain and maintain particulate and visibility standards. DEP is part of a regional planning process to determine how states will achieve visibility standards set for the national parks. This will likely require additional controls to reduce particulate emissions, primarily sulfur and nitrogen oxides, over a wide area, including Massachusetts.

- DEP passed first in the nation emission limits on CO_2 emissions from power plants. These limits were part of four pollutant regulations (SO_2, NO_x, Hg and CO_2) for six of the highest emitting facilities in the Commonwealth. The limits will begin to address the problem of global climate change from the state's perspective. As part of this effort, DEP expects to expand our emission trading program to include CO_2 trading and will be examining appropriate mechanisms that effort.

- DEP will also be assessing its air toxics programs over the next two years. The first phase, developing more comprehensive inventories is underway and data has been submitted to EPA as part of the National Air Toxics Assessment (NATA) program.

B. Baseline Conditions

What are the trends in pollutants covered by the National Ambient Air Quality Standards?

The following list describes the baseline environmental conditions at the start of the 2002-2003 Performance Partnership Agreement period:

- There has been a downward trend in ozone concentrations and exceedances of the ozone standard over the last 10 years:
- Average ozone concentrations (1-hour maximum value) at 12 out of 15 monitoring sites in Massachusetts in 1999 were below the standard of 0.125 ppm
- The ozone standard was violated at 1 site out of the 16 at which it was monitored during 1999
- In the summer of 1999, only five exceedances of the one-hour standard were recorded, four in Eastern Massachusetts, and one in Western Massachusetts; The one-hour standard remains in place for Western Massachusetts as of this writing
- Exceedances of EPA's 8-hour ozone standard were recorded at 10 out of 15 ozone monitors for the 1997-1999 period
- Emissions of NO_x and VOCs from point sources have decreased by 52% and 52%, respectively, over the last 10 years
- Carbon monoxide (CO) concentrations, as indicated by the 8-hour 2nd maximum concentration, have decreased 59% from 1987 to 2000 and remain below the standard
- The annual mean concentration for sulfur dioxide (SO_2) has decreased 38% from 1987 to 2000 and remains below the standard
- The annual mean concentration for particulate matter (PM-10) has decreased 21% from 1989 to 2000 and remains below the standard
- The annual mean concentration for lead (Pb) has gone from .155 micrograms per cubic meter in 1986 to 0.01 micrograms per cubic meter in 2000, a decline of 93%, and remains below the standard, and
- NO_2 concentrations have decreased by 26% for 1987 to 2000; in 2000, average concentrations across 6 monitoring sites showed levels at approximately 0.02 ppm (the standard is .053 ppm) and remain below the standard.

C. Milestones

The lists below describe the milestones for the National Air Strategy that DEP will achieve between 2001 and 2003:

By the fall of 2001

- Applicable Massachusetts utility sources will be in compliance with Phase 2 of the federal acid deposition requirements of the Clean Air Act
- DEP will review commitments made in its 1-hour ozone attainment demonstration; complete additional measures, if required
- DEP will submit information to demonstrate compliance with our 15 and 9% VOC plans for Eastern MA, and
- DEP will submit draft 1999 periodic inventory and comment on the EPA National Air Toxics Assessment (NATA) data release.

By the spring of 2002

- DEP will submit final 1999 periodic inventory.

By the summer of 2002

- DEP will submit one hour ozone attainment demonstration supplement for Eastern Massachusetts approvable by 9/30/02
- The attainment demonstration will address the aerospace and wood furniture
- The attainment demonstration will include a Reasonably Available Control Measures Analysis
- The attainment demonstration will include a commitment to consider those OTC model rules including architectural coatings, consumer products and gas cans. The rules which are selected will be adopted according to the following schedule:
    - Draft rule for public hearing: 10/02
    - Hold public hearings: 12/02
    - Publish final regulation: 3/03
    - Implementation: 1/04.

By the winter of 2002

- DEP will complete Title V permits.

By the end of 2003

- Massachusetts will complete its assessment of in-state PM-2.5 status.

By May 2003

- Emission controls as committed to under the last phase of the Ozone Transport Commission's NO_x Cap and Allowance Program, and as required by EPA's "NO_x Transport SIP Call" will be implemented reflecting, at a minimum, remedies outlined in the Massachusetts Ozone Attainment Submittal.

By the spring of 2004	• DEP will submit a committal SIP for regional planning within one year after EPA publishes designations for PM-2.5 for any area within the state; designations are expected in January 2003-2004.
Additional Commitments	• DEP will conduct a comprehensive assessment of its air monitoring network (completion date to be determined), and • DEP will continue to address the issues identified in EPA's technical systems audit and submit progress reports every three months until all issues have been addressed.

D. What needs to be done:

1a. Reduce ozone-forming emissions from mobile sources in order to help achieve the ozone standard set by EPA to protect public health, while accommodating population and economic growth, and **1b. Complete PM-2.5 network** and begin to understand the relationship of ozone to PM-2.5 pollution.

Management Strategies

This is how DEP will reduce ozone-forming emissions from mobile sources and assess ambient levels of PM-2.5:

- Manage the an enhanced vehicle emissions inspection and maintenance program
- Implement the California Low Emissions Vehicle program and alternative fuels program
- Operate and maintain air monitoring networks, including the PM-2.5 ambient network to enable DEP to determine mobile source contribution to PM-2.5, and
- Work with other states and EPA to develop effective public outreach strategies to explain the need for mobile source controls and provide public health protection messages.

P-A-C-E-R Activities

We will carry out our management strategies through these activities.

Permitting:

- Certify automotive repairers in the Enhanced Inspection and Maintenance program.

Assistance:

- Oversee Enhanced Inspection & Maintenance Communications Plan
- Conduct statewide auto repairer training
- Promote alternatively fueled vehicles
- Implement comprehensive outreach on Enhanced Vehicle Inspection and Maintenance Program, and
- Work with other organizations (e.g. Mass Highway on Central Artery/Third Harbor Tunnel Project and MBTA) to promote retrofits of diesel equipment and vehicles with new emission control technology.

Compliance:

- Manage Enhanced Vehicle Inspection and Maintenance Program
- Enforce emissions limits at Logan International Airport
- Implement the Rideshare Program for 1,000+ employees, and
- Implement Roadside Diesel Testing Program.

P-A-C-E-R Activities (continued)

Enforcement:

- Develop Rideshare enforcement policy.

Regulation development (includes program/policy development and legislation):

- Implement:
  - ⇒ Massachusetts "Not To Exceed" heavy duty diesel vehicle regulations
  - ⇒ LEV II standards that match revised California LEV rules, and
  - ⇒ Roadside heady duty diesel inspection program with Massachusetts State Police.
- Develop and implement revisions to Certification of Tunnel Ventilation Regulations
- Develop streamlined LEV compliance and enforcement process with Registry of Motor Vehicles
- Analyze air quality data and use the data to support such activity as
  - ⇒ ozone mapping
  - ⇒ ozone forecasting
  - ⇒ reporting the Air Quality Index to the public, including forecasted ozone levels
  - ⇒ assessing the effectiveness of existing control strategies, and
  - ⇒ developing new attainment/maintenance control strategies.

Environmental Monitoring:

- Operate and maintain air monitoring networks in compliance with 40 CFR, Part 58, submit data into AIRS and provide reports as required by 40 CFR, Part 58
- Operate a PM-2.5 ambient air monitoring network
- Link air and water acid deposition monitoring and data collection, and
- Include a 2000 PAMS Data Analysis Report that will include examples of the most well known PAMS compounds.

2a. Reduce ozone-forming emissions from large and small industries, electric generating facilities and consumer products in order to help achieve the ozone standard set by EPA to protect public health, while accommodating population and economic growth, and

2b. Complete PM-2.5 monitoring sites in order to begin to understand the relationship of ozone to PM-2.5 pollution.

Management Strategies

This is how DEP will reduce ozone-forming emissions from large and small industries, electric generating facilities and consumer products and assess ambient levels of PM-2.5:

- Issue permits (new source review, operating permits)
- Conduct multimedia inspections and take appropriate enforcement actions
- Enforce against violations at VOC and NO_x sources
- Participate in national and regional forums, and seek appropriate legal, political, and regulatory remedies to reduce the levels of ozone concentrations and ozone precursor emissions transported into Massachusetts
- Seek opportunities to incorporate market-based programs such as Emissions Trading and NO_x Cap and Allowance to ensure reduced compliance costs without sacrificing environmental quality
- Operate and maintain air monitoring networks, including the PM-2.5 sites, to characterize the extent of air pollution
- Work with other states and EPA to develop effective public outreach strategies to explain the need for industry controls and provide public health protection messages, including ozone outreach and forecasting, and
- Work with other New England states to develop action plans to reduce stationary source contributions to acid deposition and mercury, as required in the Governors' and Eastern Canadian Premiers' agreements, which may lead to stationary source controls.

P-A-C-E-R Activities

We will carry out our management strategies through these activities.

Permitting:

- Issue operating permits, with EPA involvement as described in Joint Implementation Plan
- Complete new source reviews, and permits for new power generating facilities
- Issue NO_x monitoring plan approvals, including renewal of Continuous Emissions Monitoring Certifications
- Implement "Phase II" of the Ozone Transport Commission NO_x Memorandum of Understanding beginning May 1999 (Cap and Trade Program)
- Revise operating permit fees, and
- Process Stage II self-certifications.

P-A-C-E-R Activities (continued)

Assistance:

- As noted above, work with sources in the NO_x budget program on monitoring and CEM requirements, and
- Work with sources on Stage II requirements.

Compliance:

- Conduct multimedia inspections of fuel storage facilities (Stage I and II) and industrial sources
- Conduct reviews of Continuous Emission Monitoring Excess Emission reports
- Implement Stage II Vapor Recovery standards for gas stations and auto repairers
- Conduct other inspections to:
  - ⇒ follow-up on compliance issues identified in previous inspections
  - ⇒ investigate complaints
  - ⇒ investigate patterns of noncompliance, and
  - ⇒ implement other initiatives.

Enforcement:

- Take appropriate enforcement actions.

Regulation development **(includes program/policy development, legislation):**

- Adopt new federal air standard for ozone and associated monitoring reference methods
- Make recommendations to EPA on nonattainment area boundaries for new federal ozone standard, once EPA's guidance is issued
- Implement 1999 commitments included in one-hour attainment demonstration for ozone
- Complete Stage II Vapor Recovery Enhancements
- Finalize regulations for Air Quality Streamlining
- Finalize NO_x Cap and Allowance regulations to include an allocation for summer 2003-2007 and submit by September 1999 to meet EPA's NO_x SIP call, and
- Finalize revisions to Stage II Regulations.

P-A-C-E-R Activities (continued)

Regulation development (continued)

- Revise Operating Permit Program Regulations
- Develop power plant air emissions regulations
- Submit One Hour Ozone Attainment Demonstration Supplement for Eastern MA
- Address aerospace and wood furniture compliance technique guideline
- Develop a Reasonably Available Control Measures analysis for Eastern MA to support attainment date proposed in attainment demonstration
- Include in the attainment demonstration a commitment to consider those OTC rules for architectural coatings, consumer products and gas cans
- Analyze air quality data and use the data to support such activity as
  - ⇒ ozone mapping
  - ⇒ ozone forecasting
  - ⇒ reporting the Air Quality Index to the public, including forecasted ozone levels
  - ⇒ assessing the effectiveness of existing control strategies, and
  - ⇒ developing new attainment/maintenance control strategies.

Environmental Monitoring:

- Operate and maintain air monitoring network in compliance with 40 CFR, Part 58, submit data into AIRS and provide reports as required by 40 CFR, Part 58
- Link air and water acid deposition monitoring and data collection, and
- Include a 2000 PAMS Data Analysis Report that will include examples of the most well known PAMS compounds.

3a. Manage the emissions of criteria pollutants (other than ozone), including fine particulate matter (PM-2.5), consistent with maintenance and deposition plans, and in accordance with the standards set by the EPA to protect public health, while accommodating population and economic growth

3b. Reduce acid deposition in Massachusetts and its contribution to acid deposition elsewhere, and

3c. Reduce toxic emissions.

Management Strategies

This is how DEP will control other criteria pollutants, acid deposition, and toxic emissions:

- Operate and maintain the air monitoring network, including the PM-2.5 sites to characterize the extent of air pollution
- Work with other New England states to develop action plans to reduce contributions to acid deposition and mercury, as required in the Governors' and Eastern Canadian Premiers' agreements
- Develop approach to re-scope air toxics program including development of air toxics inventory
- Develop strategies for providing public outreach on toxic emissions, target specific sources of toxics of interest to the public (e.g., municipal waste combustors) for control and compliance reviews, and
- Consider how cumulative assessments for toxics could be done.

P-A-C-E-R Activities

We will carry out our management strategies through these activities.

Permitting:

- Issue operating permits, with EPA involvement as described in Joint Implementation Plan
- Issue Acid Rain permits, as necessary
- Participate in acid rain emission monitoring program, including conducting some continuous emission monitoring audits at facilities, and
- Complete permit rewrites as required in the Municipal Waste Combustor (MWC) Regulations.

Assistance:

- Outreach and compliance assistance to sectors under the Environmental Results Program (ERP): printers, dry cleaners, and photoprocessors, and
- Design implementation of Municipal Waste Combustors Regulation to include public access to data.

P-A-C-E-R Activities (continued)

Compliance:

- Conduct multimedia inspections (ERP)
- Monitor acid rain permits
- Review/audit ERP certifications (dry cleaners, printers and photoprocessors)
- Conduct multimedia inspections at industrial sources
- Conduct reviews of Continuous Emission Monitoring Excess Emission reports, and
- Conduct other inspections to: follow-up on compliance issues identified in previous inspections; investigate complaints; investigate patterns of noncompliance; implement other initiatives.

Enforcement:

- Take appropriate enforcement actions.

Regulation development (includes program/policy development and legislation):

- Adopt new federal air standards for PM-10 and PM-2.5 and associated monitoring reference methods
- Revise DEP's medical waste incinerator regulations to reduce emissions of mercury and dioxins
- Develop regulations to control emissions from medical waste incinerators
- Analyze air quality data and use the data to support such activity as pollutant mapping, and
- Revise Operating Permit Regulations.

Environmental Monitoring:

- Operate and maintain air monitoring networks in compliance with 40 CFR, Part 58, submit data into AIRS and provide reports as required by 40 CFR, Part 58
- Enhance air toxics monitoring at Roxbury and Long Island sites
- Provide an analysis utilizing PAMS data for HAPs in urban and rural areas and determine if this information can be used with emission data from landfills and waste handing facilities to characterize cumulative impact
- Include a 2000 PAMS Data Analysis Report which include examples of the most well known PAMS compounds
- Monitor for hydrocarbon air toxics at two locations in the Boston area
- Work with EPA on the design of a national air toxics monitoring network and strategy
- Link air and water acid deposition monitoring and data collection, and
- Decide whether additional mercury monitoring is needed as required in Governors' Agreement.

Table 9: Environmental Indicators and other Performance Measures associated with the Goal: "National Air Strategy."[8]
Environmental Indicators
• # and % of Massachusetts residents exposed to air that meets the NAAQS for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter (including 2.5), and lead • *Trends in air quality for carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, particulate matter, ozone, precursor volatile organic compounds, and oxides of nitrogen concentrations from the air monitoring networks* • Ozone precursor (VOCs and NO_x concentrations) upwind and downwind of Massachusetts • Wet deposition; acidity of waterbodies susceptible to acidification
Program Outcomes
• *# of nonattainment areas(and their associated populations) that reach attainment, including the number of ozone nonattainment areas that meet the 1-hour ozone standard)* • Inventory of ozone precursor emissions of oxides of nitrogen and volatile organic compounds from all source categories • *Emissions reductions since 1990 for each criteria pollutant*
Program Outputs
• *Redesignation of areas attaining the current NAAQS, revocations of the 1-hour ozone NAAQS for areas attaining it, and designations of areas for the 8-hour ozone and PM-2.5 NAAQS* • # of gas stations and automotive dealers trained and certified in the Enhanced Inspection and Maintenance Program • # of gas stations self certified in the Stage II Vapor Recovery Program • # of companies with 1,000+ employees which have submitted Rideshare Plans

[8] Items that are italicized are also Core Performance Measures.

Prevent and Manage Waste

Prevent and Manage Waste Goals #2 and #3: Pollution Prevention and Safe Waste Management

Prevent and Manage Waste Goal #2: Pollution Prevention

Prevent and Manage Waste Goal #3: Safe Waste Management

Prevent and Manage Waste

Prevent and Manage Waste Goals #2 and #3: Pollution Prevention and Safe Waste Management

A. Self Assessment

1. Strategies to reduce and manage hazardous and solid waste

What are DEP's strategies for reducing and managing hazardous and solid waste?

DEP works to protect human health and the environment from the effects of solid and hazardous waste by preventing pollution and the generation of wastes to the maximum extent possible, promoting reuse and recycling of wastes that are generated, and ensuring sound disposal of wastes as a last resort. DEP's programs are diverse and far-ranging, bringing pollution prevention and safe waste management practices to business operations (using a facility-wide, multimedia approach), the design of certain consumer products (e.g., less toxic paints and cleaners), and to the behavior of the general public (e.g., encouraging recycling and environmentally sound purchasing).

How are these strategies implemented?

DEP carries out its pollution prevention and safe waste management strategies by:

- establishing regulatory standards
- issuing permits
- educating industry and the public
- providing compliance assistance
- verifying business self-certifications and reports, and auditing their environmental performance
- inspecting facilities, and
- initiating enforcement actions when violations are found.

What strategies will be emphasized in 2001-2002?

Key strategies to further pollution prevention include:

- implementing the Environmental Results Program (a self-certification program)
- developing strategies for reducing persistent, bioaccumulative toxic chemicals (PBTs) as part of the Toxics Use Reduction Program
- developing the Environmental Stewardship Program to encourage facilities to implement environmental management systems to help sustain and exceed compliance
- implementing the New England Governors and Eastern Canadian Premiers *Mercury Action Plan* and the Massachusetts *Zero Mercury Strategy*
- issuing permits that incorporate pollution prevention, and
- seeking pollution prevention in compliance and enforcement actions.

Key strategies to further safe waste management include:

- implementing the *Beyond 2000 Solid Waste Master Plan*
- ramping up municipal and commercial source reduction and recycling programs
- expanding the Household Hazardous Products (HHP) Program
- implementing risk evaluations for new or expended solid waste facilities
- revising the solid waste permitting regulations to incorporate enhanced landfill liner design requirements, improved beneficial use determination process, and increased recycling commitments from solid waste facilities
- ensuring proper waste management through permitting, and
- ensuring proper waste management through compliance and enforcement, including increased enforcement of solid waste bans.

2. Solid Waste

How much trash does Massachusetts generate?

Figure 31 below shows the annual amount of solid waste generated in Massachusetts from 1995 through 1998, and how it was managed. Solid wastes included in DEP's Solid Waste Master Plan are municipal solid waste (typical trash from households and businesses) and non-municipal solid waste (primarily construction and demolition debris). In 1999, 50% of all waste generated was diverted from disposal to recycling. Note: Methodology and data have been updated recently, so Figure 30 below is different from Figure 30 in the Draft PPA.

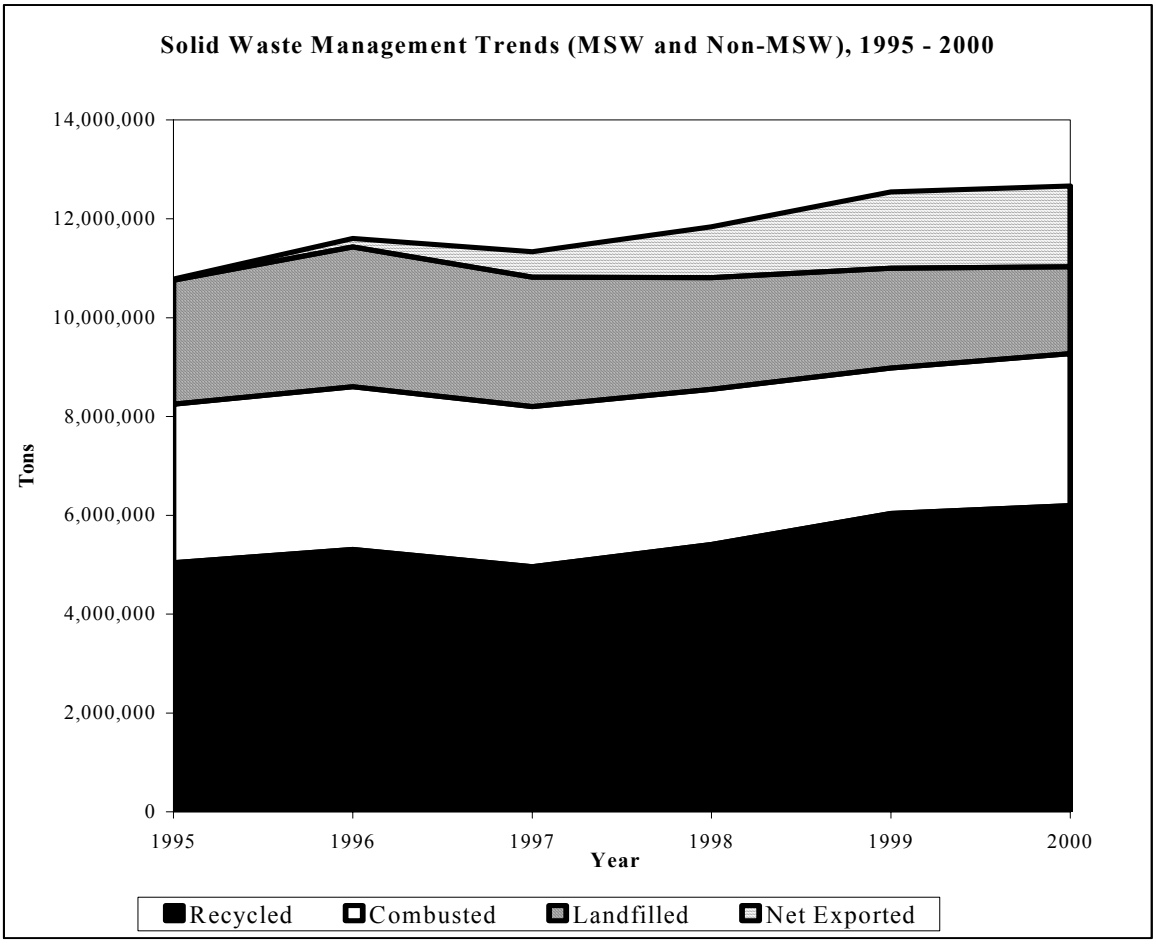


Figure 30

How much trash does Massachusetts generate? (continued)

Table 10 shows a breakdown of 1998 and 1999 Massachusetts solid waste into municipal (MSW) and non-municipal (non-MSW) categories. Data has been revised since 1998 due to additional data and improved methodology. Some totals do not add due to rounding.

Table 10: Solid Waste Management in 1998, 1999, and 2000 (millions of tons)

	1998	1999	2000
Generated Solid Waste	11.80	12.54	12.64
• *Municipal*	*7.38*	*7.59*	*7.99*
• *Non-Municipal*	*4.43*	*4.95*	*4.66*
Recycled Solid Waste	5.41	6.04	6.20
• *Municipal*	*2.29*	*2.52*	*2.70*
• *Non-Municipal*	*3.12*	*3.52*	*3.50*
Instate Disposed Solid Waste	5.40	4.96	4.83
• *Municipal*	*4.19*	*3.90*	*4.08*
• *Non-Municipal*	*1.21*	*1.06*	*.75*
Net Exported Waste	1.03	1.55	1.61
• *Municipal*	*0.89*	*1.18*	*1.20*
• *Non-Municipal*	*0.14*	*0.37*	*.42*

What does DEP do to regulate solid waste?

DEP regulates the siting, design, operation, and closure of solid waste facilities — including landfills, incinerators, trash transfer stations, and certain recycling and composting facilities — to ensure that these facilities do not pose risks to public health and the environment. DEP establishes performance standards that these facilities must meet, issues permits, conducts inspections, and takes enforcement actions where necessary. DEP has been working with municipalities across Massachusetts for several years to close unlined landfills. In 1993, 105 active unlined municipal landfills were targeted for closure; DEP has now closed all but two active unlined MSW landfills (see Figure 31 below).

Number of Unlined Landfills in Use, 1992 - 2002

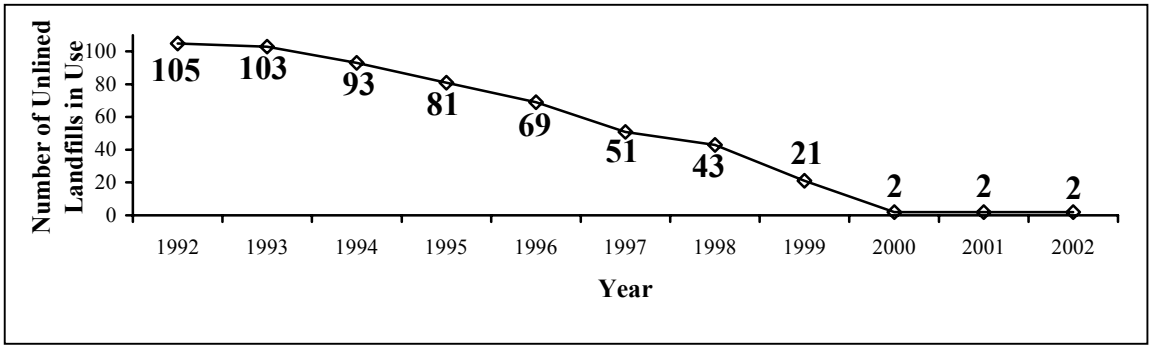


Figure 31

What does DEP do to reduce the amount of waste disposed in landfills and incinerators?

DEP promotes source reduction (producing less waste), toxicity reduction (keeping toxic materials out of landfills and incinerators), and recycling through a variety of programs, most of which are directed at helping municipalities implement local recycling and household hazardous products collection programs. In 2001, DEP expects to receive $14 million from the Clean Environment Fund which will be used to assist municipal recycling programs through recycling equipment grants, incentive payments, and community outreach grants. DEP's strategy for 2001 includes increasing access for citizens that currently have no recycling services, encouraging greater industry participation in commercial recycling, increasing source reduction activities (i.e., on-site composting), reducing the toxicity of waste streams, and improving markets for recoverable materials. DEP is working to make existing waste bans (which prohibit disposing of recyclable materials) a more effective tool for diverting materials from landfills and incinerators. DEP recently hired four additional inspectors to enforce waste ban compliance plans at landfills, incinerators, and transfer stations.

What are Massachusetts' recycling and solid waste milestones?

In 2000, DEP published the *Beyond 2000 Solid Waste Master Plan*, laying out a ten-year strategy for managing the Commonwealth's solid waste. This Plan reaffirmed the Commonwealth's integrated waste management hierarchy favoring source reduction, followed by recycling, and disposal as a last resort. It also set the following milestones for 2010:

- Achieve 70% waste reduction (which includes both source reduction and recycling), including:
  - 60% municipal solid waste (MSW) waste reduction, and
  - 88% construction and demolition (C&D) waste reduction
- Substantially reduce the use and toxicity of hazardous products and provide convenient hazardous product collection services to all residents and very small quantity hazardous waste generators.

Where is Massachusetts relative to these milestones?

Since 1990, Massachusetts has made great strides in diverting waste from disposal. The recycling rate for municipal solid waste has risen from 10% in 1990 to 38% in 1999. The total MSW waste reduction rate (which includes source reduction and recycling) was 39% in 1999.

Access to comprehensive recycling services for Massachusetts residents has increased from 10% in 1990 to 85% in 1999. In addition, DEP has continued to promote efforts to reduce the toxicity of the waste stream by recycling or otherwise properly managing hazardous household products. To date, over 100 household hazardous products collection programs have been established to collect and recycle or dispose of paint, used oil, mercury-containing products (such as batteries, thermostats, and fluorescent lamps), and other products; these programs currently serve nearly 50% of the population.

What are Massachusetts' solid waste plans for the future?

DEP's strategies for the future are described in the *Beyond 2000 Solid Waste Master Plan*. The overarching goal of the *Master Plan* is environmentally sound waste management through a reduction in the amount and toxicity of waste generated, an increasing rate of recycling, and the provision of environmentally safe disposal capacity.

How is mercury addressed in DEP's solid waste plans?

DEP has developed a comprehensive mercury reduction strategy. Addressing air emissions through pollution control equipment is short-term portion of strategy. At the strategy's core, however, is pollution prevention. This includes diverting mercury out of the waste stream through means such as recycling and source substitution. Massachusetts is also a signatory to the New England Governors and Eastern Canadian Premiers *Mercury Action Plan*, and intends to meets the goals of that plan.

For further discussion of the air-related portion of the strategy, please refer to Part 2e in the Bureau of Waste Prevention's Goal #1, National Air Strategy.

3. Toxics Use Reduction

What is the Toxics Use Reduction Program?

The Toxics Use Reduction Act (TURA) was passed by the Massachusetts Legislature in 1989. It promotes environmental protection by working with industry and focusing on pollution prevention as a way to comply with, and exceed, regulatory standards while increasing the economic competitiveness of Massachusetts industry. The goals of TURA are to:

- reduce toxic waste generated by 50% by 1997
- establish toxics use reduction as the preferred means for achieving compliance with any federal or state law or regulation
- sustain, safeguard and promote the competitive advantage of Massachusetts businesses, large and small, while advancing innovation in toxics use reduction and management
- promote reductions in the production and use of toxic and hazardous substances in the Commonwealth
- enhance and strengthen the enforcement of existing environmental laws and regulations, and
- promote coordination and cooperation between all Massachusetts agencies that administer toxics-related programs.

The Act gave DEP the responsibility for working with industry to meet these goals, along with its TURA partners, the Office of Technical Assistance in the Executive Office of Environmental Affairs and the Toxics Use Reduction Institute at the University of Massachusetts of Lowell. DEP's responsibilities include administering the required TUR planning and reporting by industry, multimedia compliance and enforcement, managing TUR program data, and certifying TUR planners.

In October 1999, DEP and its partner TURA agencies received an *Innovation in American Government Award* for the Toxics Use Reduction Program from the Ford Foundation and the Kennedy School of Government, in partnership with the Council for Excellence in Government. This award is considered to be among the nation's most prestigious public service honors, and recognizes government initiatives that provide creative solutions to pressing social and economic problems.

How are the TURA Goals being met?

As a result of the Toxics Use Reduction Program, participating Massachusetts' manufacturers have reduced their use of toxics by 41%, and their toxic byproduct by 57%, between 1990 and 1999. Massachusetts' manufacturers have also reduced their on-site releases of chemicals by 87% since 1990. See Figure 32 below.

The principles of pollution prevention, the underpinning of TURA, have been applied to DEP's permitting, compliance and enforcement, and regulatory activities, particularly in the Bureau of Waste Prevention. The impact of the application of these principles has been reductions in releases and discharges into the environment. This has been accomplished through source reduction techniques and new approaches to environmental protection such as the Environmental Results Program.

To read about air toxics and mercury, please refer back to Goal #1 (National Air Strategy, part e).

Massachusetts Toxics Use Trends, 1990 to 1999, adjusted for changes in reporting universe

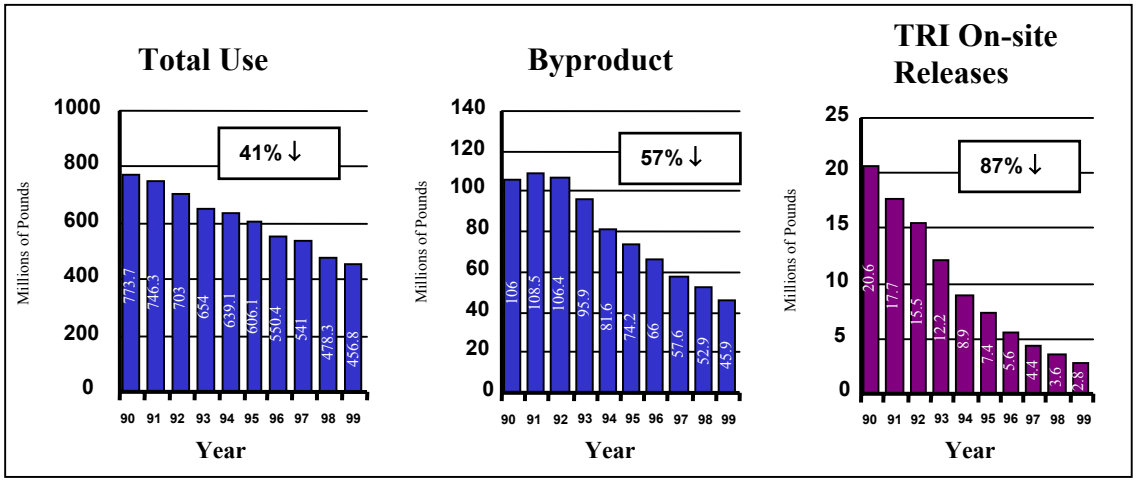


Figure 32

What are the challenges for the Toxics Use Reduction Program?

Challenges for the Toxics Use Reduction Program over the next few years include:

- **Promote Environmental Stewardship.** With the assistance of DEP, the Office of Technical Assistance and TURI, EOEA is developing an Environmental Stewardship Program that will reward companies for superior environmental performance.

- **Continue to incorporate pollution prevention principles into all DEP programs.** DEP is continuing to promote integration into all of the agency's activities.

- **Reduce PBTs.** DEP has adopted lower thresholds for reporting persistent, bioaccumultive toxic chemicals (PBTs) under the TURA program. A major concern of industry is how to develop toxics use reduction plans for reducing what may be very small quantities of PBTs. DEP will work with its partner agencies and program stakeholders to devise a strategy for addressing PBTs.

- **Better educate the public about economic advantages of pollution prevention.** DEP will continue to publish its annual TURA Information Release in a reader-friendly format, explaining the relevance of chemical use and chemical waste to the general public. DEP hopes to develop public awareness of the risks involved in transporting, using, and disposing chemicals.

4. Hazardous Waste Program

What are the mandates and goals of the Hazardous Waste Program?

The federal Resource Conservation and Recovery Act of 1975 (RCRA) establishes nationwide hazardous waste requirements. In 1985, EPA delegated the base hazardous waste program to Massachusetts, which implements the program under the authority of M.G.L. Chapter 21C.

The primary mandates of RCRA include the definition and listing of hazardous wastes and requirements for generators, transporters and facilities. To meet those requirements, DEP maintains a:

- Program to permit hazardous waste treatment, storage and disposal facilities
- Program to license hazardous waste transporters
- Policy and regulation program, and
- Compliance and enforcement program aimed at hazardous waste generators as well as hazardous waste treatment, storage, or disposal facilities.

DEP's management of hazardous waste is more stringent than RCRA in three main areas: the Transporter Program, the Hazardous Waste Recycling Program and the management of waste oil, which is the largest hazardous waste by volume in the Commonwealth.

How is DEP meeting the mandates and goals of the RCRA and Hazardous Waste Program?

DEP currently licenses 16 hazardous waste treatment, storage, or disposal facilities (TSDFs). All 16 facilities are dedicated to storage activities. A few conduct treatment, while none dispose of hazardous waste on-site. Some TSDFs recycle hazardous waste.

DEP licenses approximately 135 hazardous waste transporters (for five years at a time), of which 93 are from out-of-state. Field audits indicate general compliance with requirements; the most common violations relate to manifest completeness.

The Recycling Program presently manages 1,500 permits for recycling hazardous waste. These permits include regulated recyclable materials, waste oil, precious metals, and other hazardous wastes.

What are some of the Hazardous Waste Program's successes?

Since RCRA was developed to prevent the creation of new hazardous waste sites by requiring safe waste management practices, the prime measure of success is the number of sites that have been created since the program's implementation. Using this measure, DEP has been very successful; the creation of new sites through the mismanagement of hazardous wastes (e.g. "barrel sites" or abandoned hazardous waste disposal facilities) has been virtually eliminated.

Hazardous waste compliance and enforcement activities aimed at generators and TSDFs are conducted using a whole facility approach. The types of violations typically found at facilities generally relate to administrative requirements, including marking and labeling. These violations rarely result in a significant threat to public health or the environment. This indicates that hazardous wastes are being safely managed. In addition, interstate shipments of hazardous waste that are headed for ultimate disposal have not been problematic as they often were in the past.

The number of hazardous waste Large Quantity Generators (LQGs), defined as a generator of over 1,000 kilograms (or 265 gallons) per month of hazardous waste has significantly declined over the past decade. In 1986, DEP regulated 1,100 LQGs. As of August 2001 that number has dropped to 496. This trend indicates that industry has been successful in reducing wastes by using pollution prevention strategies.

DEP has developed innovative programs for "hard-to-manage" manufactured consumer items which are technically classified as hazardous waste under federal law. A significant example is the program to manage mercury-containing fluorescent lamps and batteries. The infrastructure associated with managing these wastes and the DEP investment in public outreach have resulted in a significant increase in the recycling and safe management of these waste streams, and have put DEP in a national leadership position in this area of waste management.

What are the challenges for the Hazardous Waste Program in 2002 and 2003?

Regulation and policy development activities for 2002 and 2003 will focus on streamlining regulations and permits, and integrating pollution prevention and source reduction practices into all activities. The following will be included:

- Regulatory amendments to streamline the Class A hazardous waste recycling program
- Amendments that clarify a generator's ability to treat on-site, in tanks and containers and the use of zero discharge hazardous wastewater treatment units, and
- Administrative process amendments to streamline the hazardous waste facility licensing process.

DEP will also continue its efforts to update and obtain federal authorization for state regulations (310 CMR 30.000). DEP submitted to EPA draft authorization regulations (checklists C1-C3 and non HSWA I-IV and HWSA I-III) in March 2001. DEP and EPA have identified outstanding issues and DEP is preparing documentation to support a request for full or partial authorization. These documents will be completed in November 2001.

DEP will continue to dedicate resources to develop policies and programs to manage other "hard-to-manage" manufactured consumer products, building upon the success of the mercury-containing waste product program. This challenge includes the successful continuation of the CRT initiative and then work on other waste streams, such as mercury dental wastes and laboratory dental wastes.

DEP plans to evaluate and propose regulations to clarify use of M.G.L. c. 21C waiver authority.

DEP will evaluate proposed federal changes and potential state changes to existing hazardous waste manifest regulations.

DEP will also evaluate the potential benefits of seeking authorization to implement the RCRA Corrective Action Program employing the Massachusetts Contingency Plan (M.G.L. c. 21E).

5. Environmental Results Program

What is the Environmental Results Program?

The Environmental Results Program (ERP) is designed to enhance and measure performance of whole business sectors. ERP is an innovative program that replaces case by case permits with stringent industry-wide environmental performance standards and an annual certification of compliance. The certification requires the facility to answer specific questions about whether it is meeting applicable environmental performance standards. If it is out of compliance, the facility must submit a compliance plan detailing how and when it will achieve compliance. The certification must be signed, under pains and penalties of perjury, by a high-ranking corporate official, raising the level of corporate accountability for environmental compliance. DEP provides compliance workbooks and other types of outreach to facilities before certification; pollution prevention opportunities are highlighted for each sector.

ERP currently applies to three small business sectors: dry cleaning (650 facilities), photoprocessing (550 facilities), and printing (1,100 facilities). Two additional sector rollouts are underway: firms discharging industrial to sewers wastewater, and firms installing new boilers.

How were principles and performance standards developed?

DEP worked with industry representatives, environmental advocates, and other government agencies to establish the broad principles behind ERP. In addition, DEP works specifically with affected industry groups to establish the performance standards applicable to that industry.

How will ERP be evaluated?

Performance is measured by "environmental business practice indicators" based on data gathered during randomly chosen facility inspections performed before and after certification. With the use of statistics, inspection data is then scored and used to track changes in specific business practices as well as to measure performance over time. The ultimate goal is to use the results of this analysis to create a sustainable regulatory system that directs limited resources to areas of greatest need.

What are the program's successes?

A major success has been identifying and getting small business sectors into the regulatory system and in compliance with environmental standards. For example, before the ERP for dry cleaners, only 10% of the affected facilities were identified in the DEP regulatory system. At the end of the first round of certification, 87% were in the system and participating, and by the end of the second round, the percentage rose to 95%. Comparable results were achieved by the photoprocessors and by the printers.

Both qualitative and qualitative results reveal higher environmental performance after the first certification. Both dry cleaners and photoprocessors has a statistically significant increase in environmental performance as a result of ERP. In the first year of ERP, 10% of facilities self-disclosed violations and committed to return to compliance. Printers were found to have reduced VOC emissions, ceased disposal of hazardous waste with solid waste, and eliminated practices such as washing ink-contaminated press rollers in sinks. Dry cleaners were found to have made significant compliance and pollution prevention changes to their operations as a result of ERP. Changes included: instituting leak detection and repair programs; changing filters more regularly; vacuuming coils on a schedule; scheduling full loads whenever possible; and eliminating illegal wastewater discharges. Finally, photoprocessors found that ERP prompted reductions in silver discharges to POTWs through installation of silver recovery units and frequent planned cartridge changes.

What are the program's challenges?

In order to grow the Environmental Results Program and expand it to new sectors, an automated system is necessary. Currently, all certification forms are manually entered and reviewed. DEP is working towards the goal of creating a system that would be entirely automated, i.e. certifications would be entered into a system electronically through telephone, fax, or scanning equipment, and with the use of business rules or intelligence, the system would be able to review all facility certifications, identify inconsistent data or "red flags," score performance of all facilities, and generate, as appropriate, follow-up enforcement documents, such as warning letters and notices of noncompliance.

6. Industrial Wastewater — Redesign of Sewer Connection Program

What are the goals of the Industrial Wastewater Program?

The goal of the Industrial Wastewater (IWW) Program is to reduce environmental harm resulting from industrial wastewater discharges. The Program regulates three types of dischargers: dischargers to the surface water, indirect dischargers (through the sewers to Publicly Owned Treatment Works or POTWs), and dischargers to the groundwater. The sewer connection program implements the Massachusetts Clean Waters Act and associated regulations (314 CMR 2.00, 7.00 and 12.00), which apply to the management of industrial wastewater going to Publicly Owned Treatment Works (POTWs). DEP is currently evaluating and redesigning the entire IWW program, starting first with indirect dischargers and POTWs.

At present, DEP's primary goal is to enhance coordination between and compliance with locally issued industrial sewer discharge permits and DEP-issued industrial wastewater discharge permits.

The following strategies support this goal:

- Incorporate pollution prevention requirements into the sewer connection regulations while continuing to provide pollution prevention technical assistance
- Focus DEP industrial wastewater resources on addressing the most significant industrial wastewater sewer discharges
- Streamline and clarify DEP and EPA roles and responsibilities
- Use local resources to the maximum extent appropriate by delegating authority when suitable, and
- Integrate the industrial sewer connection program into DEP's Watershed Approach to assess environmentally significant dischargers.

What facilities are regulated?

DEP regulates the following industrial facilities:

- Approximately 30,000 industrial and commercial facilities covered by DEP's industrial sewer connection permit program
- Several thousand sanitary sewer connections and extensions (i.e., non-industrial sources such as condominiums), and
- 140 POTWs in Massachusetts (50 with Industrial Pretreatment Programs and 90 with no Pretreatment Programs)

What is the status of the Program Revisions?

The conceptual approach to the redesign of the indirect dischargers has been developed and accepted by an 80-person advisory committee. The approach combines ERP certifications and the water basin planning cycle. It has five components:

- annual ERP certifications by the major dischargers
- evaluation of the remainder in the context of the 5-year basin cycle and individual basin needs
- the creation of a multimedia POTW evaluation methodology
- revision of sanitary connection and extension permits, and
- development of capacity management guidance for sewer collection systems, as part of a coordinated effort by six northeastern states.

DEP is in the process of developing the certification regulations for the major dischargers.

What are the challenges for 2002-2003?

DEP has identified the following as challenges for the next 2 years.

- Draft regulations for Phase I: certifying locally-permitted industrial sewer dischargers
- Develop a comprehensive and effective evaluation and delegation process for POTWs, and
- Evaluate non-certifying dischargers in the context of the 5-year basin cycle.

B. Pollution Prevention and Safe Waste Management: Baseline Conditions

Baseline environmental conditions related to Safe Waste Management and Pollution Prevention at the start of the 2000 Performance Partnership Agreement period include:

- In 1999, 592,401 tons of RCRA hazardous waste were generated in Massachusetts
- In 1999, 1.38 billion pounds of toxics were used and 135 million pounds were generated by large quantity toxic users
- In 2000, 4.64 million tons of non-municipal solid waste were generated
- In 2000, 7.99 million tons of residential and commercial municipal solid waste were generated; 34% of this was recycled or composted; this does not include home composting, which is now considered source reduction
- In 2000, 7.99 million tons of municipal sold waste were generated; 3.06 million tons were incinerated and 1.01 million tons were landfilled, and
- In 2000, an estimated 5,000 tons of household hazardous waste were collected.

C. Pollution Prevention and Safe Waste Management: Milestones

The following list describes the milestones for pollution prevention and safe waste management DEP will achieve between 2001 and 2003.

By 2002

- DEP will propose to submit an authorization application for checklists #1-3 and regulations
- DEP will start EPA checklist and regulation development for C4-C6
- Promulgate revisions to DEP's solid waste regulations. Highlights include:
  - ⇒ Establish a ban on the disposal of unprocessed construction and demolition waste
  - ⇒ Institute double liner requirements for new landfills, and
  - ⇒ Institute Recycling Benefit Plans at solid waste facilities.

By 2003

- DEP will meet the commitment in the New England Governors and Eastern Canadian Premiers *Mercury Action Plan* to achieve a 50% reduction in man-made mercury releases, and
- DEP proposes to submit to EPA an authorization package for C4-C6 and to start EPA checklist and regulation development for C7-C9.

By 2004

- DEP proposes to submit to EPA an authorization package for C7-C9.

Prevent and Manage Waste Goal #2: Pollution Prevention

What needs to be done

- **Decrease the use of toxic substances**
- **Decrease the toxicity of all waste streams, and**
- **Decrease the amount of solid and hazardous waste generated**.

Management Strategies

This is how DEP will decrease the use of toxic substances, the toxicity of all waste streams, and the amount of solid and hazardous waste generated:

- Encourage pollution prevention through the Environmental Results Program (ERP)
- Develop the next generation of the Toxics Use Reduction Program
- Incorporate principles of pollution prevention into all DEP programs
- Educate the public, communities, and businesses concerning the environmental and public health advantages of generating less waste and the techniques available to reduce waste at the source
- Encourage less use of hazardous household products and provide access to proper disposal options
- Conduct multimedia inspections and take appropriate enforcement actions
- Reduce emissions from facilities, and
- Assist in the development of collection infrastructures and markets for recyclable materials.

P-A-C-E-R Activities

We will carry out our management strategies through these activities.

Permitting:

- Integrate pollution prevention principles into permits.

Assistance:

- Promote pollution prevention through education and technical assistance
- Promote the use of innovative technologies that reduce pollution
- Issue the Governor's Award for Toxics Use Reduction to businesses that have demonstrated outstanding progress in pollution prevention
- Conduct Pollution Prevention Poster Contest involving over 400 elementary schools
- Issue the TURA Information Release
- Implement the *Mercury Action Plan*
- Support Environmental Management Systems Strategy
- Develop ERP workbooks and other outreach materials for industrial wastewater and boilers
- Hold ERP sector workshops
- Provide financial and technical assistance to promote source reduction programs
- Provide guidance and training to municipalities on household hazardous products collection centers, and
- Provide financial and technical assistance to promote access to recycling and markets for recovered materials.

P-A-C-E-R Activities (continued)

Compliance:

- Conduct multimedia and single medium inspections
- Review facility monitoring reports, ERP Certifications, and ERP return to compliance plans, and
- Conduct ERP inspections.

Enforcement:

- Continue to develop a pollution prevention enforcement measures and tracking systems
- Take appropriate and timely enforcement actions, and
- Incorporate pollution prevention into enforcement actions.

Regulation development (includes program/policy development and legislation):

- Regulations for new ERP Sectors: small boilers and wastewater dischargers
- Incorporate PBTs into the Toxics Use Reduction Regulations
- Look for opportunities for pollution prevention incentives in DEP regulations and policies
- Develop policies: Limited Plan Approval and Plantwide Allowable Limit Policy
- In 2002, submit regulations to EPA for RCRA Authorization packages for C1 – C3 and to start checklist and regulation development of C4-C6
- In 2003, submit regulations to EPA for RCRA Authorization packages for C4 – C6 and to start checklist and regulation development of C6-C8
- In 2004, submit regulations to EPA for RCRA Authorization packages for C7 – C9
- Ban the disposal of unprocessed construction and demolition waste, and
- Implement the Lead Safe Boston XL Project, which issued this policy-Management of Wastes from Lead Abatement, Remodeling and Renovation Activities Conducted in Households, May 2001.

Table 11: Environmental Indicators and other Performance Measures associated with the Goal of "Pollution Prevention."[9]
Environmental Indicators
• *Trends in emissions of toxic air pollutants (TRI supplemented by TURA)* • Air toxics ambient data from the state's special ozone monitoring network and special monitoring studies • Freshwater fish tissue concentrations of mercury
Program Outcomes
• *Reduction in air toxic emissions from 1990 levels* • Reduction in daily toxic emissions resulting from the Enhanced Vehicle Maintenance Program effective 10/1/99 • Reduction in daily toxic emissions resulting from the Stage II Vapor Recovery Program • % of non-product outputs reduced for TURA reporters • % of non-product outputs reduced for TURA reporters with waste normalized for production • For TURA reporters the % of production units reflecting reductions from P2 • Quantity (# of lbs.) of toxics used and generated as waste by-products • Emissions of air toxics, in particular mercury, other heavy metals and VOCs • Amount of mercury diverted from the waste stream • Stack tests results from sources emitting mercury and subject to testing requirements • # of mercury freshwater fish advisories/concentration of mercury in fish
Program Outputs
• *State progress in collecting and compiling ambient and emission source data for toxics to better understand the nature and extent of the air toxics problem* • # of inspections • # of enforcement actions • Financial and t technical assistance efforts • # of Toxics Use Reduction Trainings regarding FY2000 Reporting Guidance • # of ERP Sector Workshops Held • # of ERP certifications • # of new ERP industrial sectors rolled out • Publication of the TURA Data Release • Amount of solid waste diverted from the waste stream through Bottle Bill redemptions • Regulations

[9] Items that are italicized are also Core Performance Measures.

Prevent and Manage Waste Goal #3: Safe Waste Management

What needs to be done

- **Divert solid and hazardous waste from disposal through reuse and recycling,** and
- **Manage solid and hazardous waste streams in a way which minimizes risk to public health.**

Management Strategies

This is how DEP will promote recycling, divert solid and hazardous waste from disposal, manage solid and hazardous waste to protect public health, and ensure adequate solid waste disposal capacity:

- Increase access to and participation in recycling and household hazardous products programs
- Implement the *Beyond 2000 Solid Waste Master Plan*
- Ensure that regulatory standards are met at all solid and hazardous waste facilities, and
- Promote alternative and beneficial use of waste material.

P-A-C-E-R Activities

We will carry out our management strategies through these activities.

Permitting:

- Reissue hazardous waste licenses on a five to seven year basis
- Issue solid waste licenses, approvals and permits
- Review and approve Beneficial Use Determinations, and
- Require Recycling Benefits Plan with new solid waste facility permits

Assistance:

- Provide grants for recycling and composting equipment; recycling technical assistance; recycling incentive programs; transfer stations; "Pay as You Throw" Programs and research and development
- Provide general consumer education to raise awareness and participation in recycling, including a statewide education campaign
- Implement the Municipal Recycling Incentive Program to provide performance based grants to municipalities designed to increase access and participation in recycling programs
- Distribute funds from the recycling business development loan fund and Recycling Industry Reimbursement Credit to recycling-related businesses, in order to expand the markets for recycled materials and products
- Expand Household Hazardous Products Programs
- Participate in Buy Recycled Vendor Programs
- Conduct commercial outreach on waste bans
- Sponsor Massachusetts Recycles Day/Week of activities, and
- Promote environmental education and assistance in public schools through the Recycling Education Program and the Healthy Schools Program.

P-A-C-E-R Activities (continued)

Compliance:

- Conduct multimedia inspections (or equivalent) of:
- Commercial treatment, storage, and disposal facilities
- Solid waste facilities
- Industrial wastewater dischargers (including POTWs)
- Hazardous waste generators
- Complete Biennial Reporting for 1999
- Continue to work toward changeover from RCRIS to RCRA Info for hazardous waste reporting
- Conduct other inspections to:
  - ⇒ follow-up on compliance issues identified in previous inspections
  - ⇒ investigate complaints
  - ⇒ investigate patterns of noncompliance
  - ⇒ implement other initiatives
- Monitor facility and generator reporting and track hazardous waste manifests to identify noncompliance, and
- Monitor municipal waste combustor compliance with source separation plan requirements

Enforcement:

- Take appropriate enforcement actions for violations of permits and regulations, and
- Enhance waste ban inspection and enforcement efforts.

Regulation development (includes program/policy development and legislation):

- Promulgate regulations for:
  - ⇒ Asbestos revisions
  - ⇒ Solid Waste Permitting
  - ⇒ Hazardous Waste Regulation Recodification/Authorization Project (RAP)
  - ⇒ Hazardous Waste Transporter Streamlining
  - ⇒ Composting Facilities
  - ⇒ Recycling Industry Reimbursements
- Publish status report on *Beyond 2000 Solid Waste Master Plan*
- Publish guidance for household hazardous product collection centers
- Publish policies including pesticide contaminated soil management, Recycling Benefits Plans, and
- Reform the solid waste Beneficial Use Determination Process.

Table 12: Environmental Indicators and other Performance Measures associated with the Goal of "Safe Waste Management."[10]
Environmental Indicators
• At this time, no environmental indicators exist for this goal. EPA and states are developing indicators for future use
Program Outcomes
• *% of hazardous waste managed at Treatment, Storage, and Disposal Facilities (TSDFs) with approved controls in place* • Volume of leachate collected at operating landfills • Amount of solid waste disposed in landfills, resource recovery facilities relative to the total generated in-state • Total (# of tons) solid waste generated • Annual amount (# of tons) of solid waste recycled and composted relative to the amount generated • Weight or volume of household hazardous products collected and reused, recycled or properly disposed • # of RCRA notifiers who report releases under state Superfund regulations (note: this indicator is under development and may be reported this year) • # of new sites created due to the mismanagement of hazardous waste (note: this indicator is under development and may be reported this year) • Annual generation of hazardous waste (# of tons) safely managed • Amount of energy saved through recycling • Amount of greenhouse gas prevented through recycling • Amount of pollution reduced through recycling
Program Outputs
• # of inspections • # of enforcement actions • # of permits • Grant dollars distributed and assistance provided • # of Beneficial Use Determinations

[10] Items which are italicized are also Core Performance Measures.